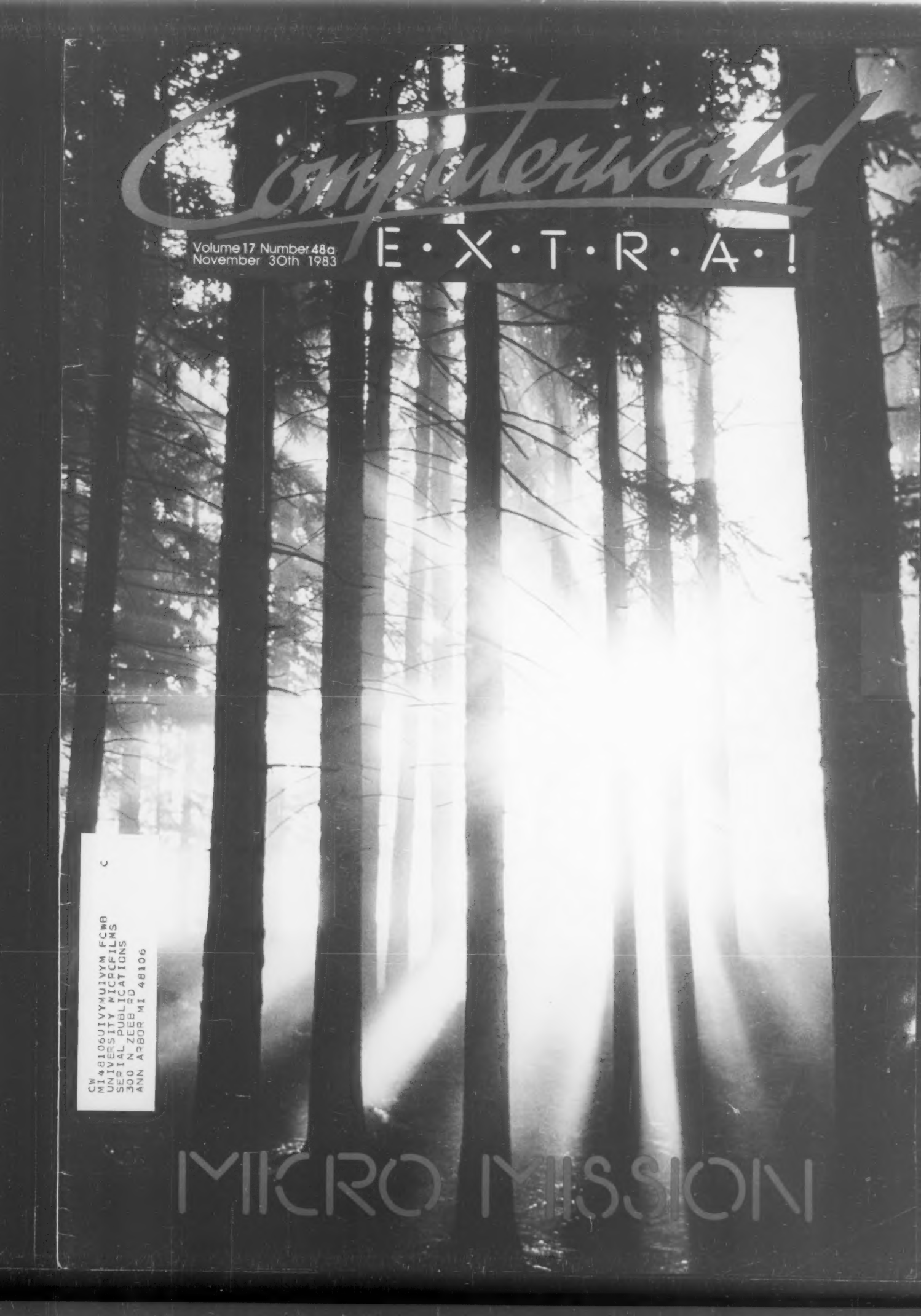

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This issue of *Computerworld Extra!* is dedicated to marking the boundaries of microcomputer use in corporate data processing.

Table of Contents

5 **Where the Chips Will Fall**
By Marc H. Rudov
Predicting the future of the micro industry is like spinning a wheel of fortune.

11 **The Micro-to-Mainframe Link**
By Robert Zack and Steven Guthrie
The micro-to-mainframe link is tugging at the heartstrings of corporate data processing departments.

16 **Computerworld Extra! Roundtable**
Four micro experts from large organizations lay the cards on the table, expressing their thoughts on the Micro Mission.

23 **Unraveling Network Architecture**
By Timothy J. Wise and Edward F. Mangiaratti
A look at the vagaries of micros, IBM 3270 terminal emulation and the multiheaded monster known as SNA.

27 **Writing With the Processed Word**
By Susan Harmon
With the widening availability of word processing software, it is hard to refer to micros as just "glorified typewriters."

41 **The Politics of Implementation**
By Don L. Eddy and Connie L. Gordon
The introduction of microcomputers in an organization may set off a battle of vested interests.

47 **Breaking Ground**
By Walter Ulrich
Implementing a microcomputer policy at a billion-dollar company requires a strong task force.

51 **Peripherals: Fit to Be Tied**
By Martin Alpert
Increasingly sophisticated users are hanging increasingly sophisticated peripherals on their micros.

57 **The Expansion of Spreadsheets**
By Hannah I. Blank
Spreadsheets may be old hat, but choosing the right one can put you at the head of the class.

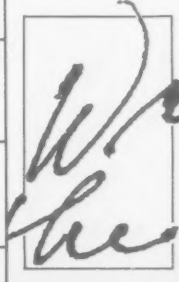
59 **Portable Productivity**
By William Murto
Who says you can't take it with you? A growing line of portable computers is increasing work productivity.

63 **A Networking Primer**
By Marshall D. Abrams
Too much of a good thing can turn into a corporate headache. Here is a basic guide to networking micros.

67 **Going to Bat for Diversity**
By Todd D. Doersch and Thomas J. Kosnik
Even the best microcomputer may strike out when asked to score with the wrong application.

71 **Constructing an Information Center**
By Chester R. Mills
The corporate information center is evolving with the increasing use of micros for business applications.

75 **The New Wave of Computer Graphics**
By Alexis Driscoll and Robin Howard
If the medium is the magic, graphics is the Merlin of the microcomputer software age.



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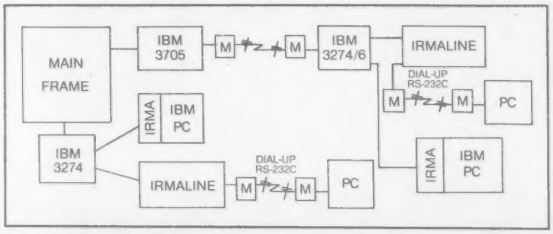

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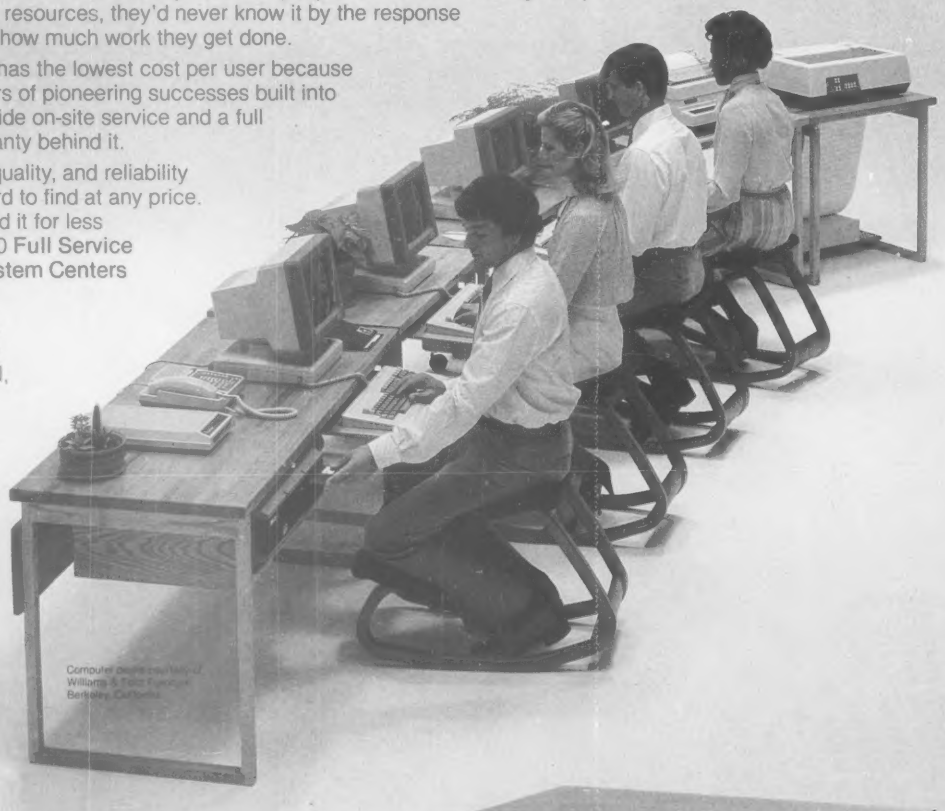

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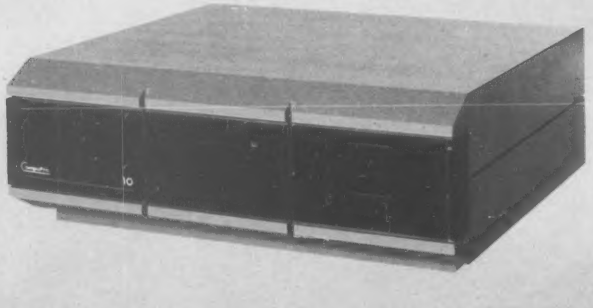

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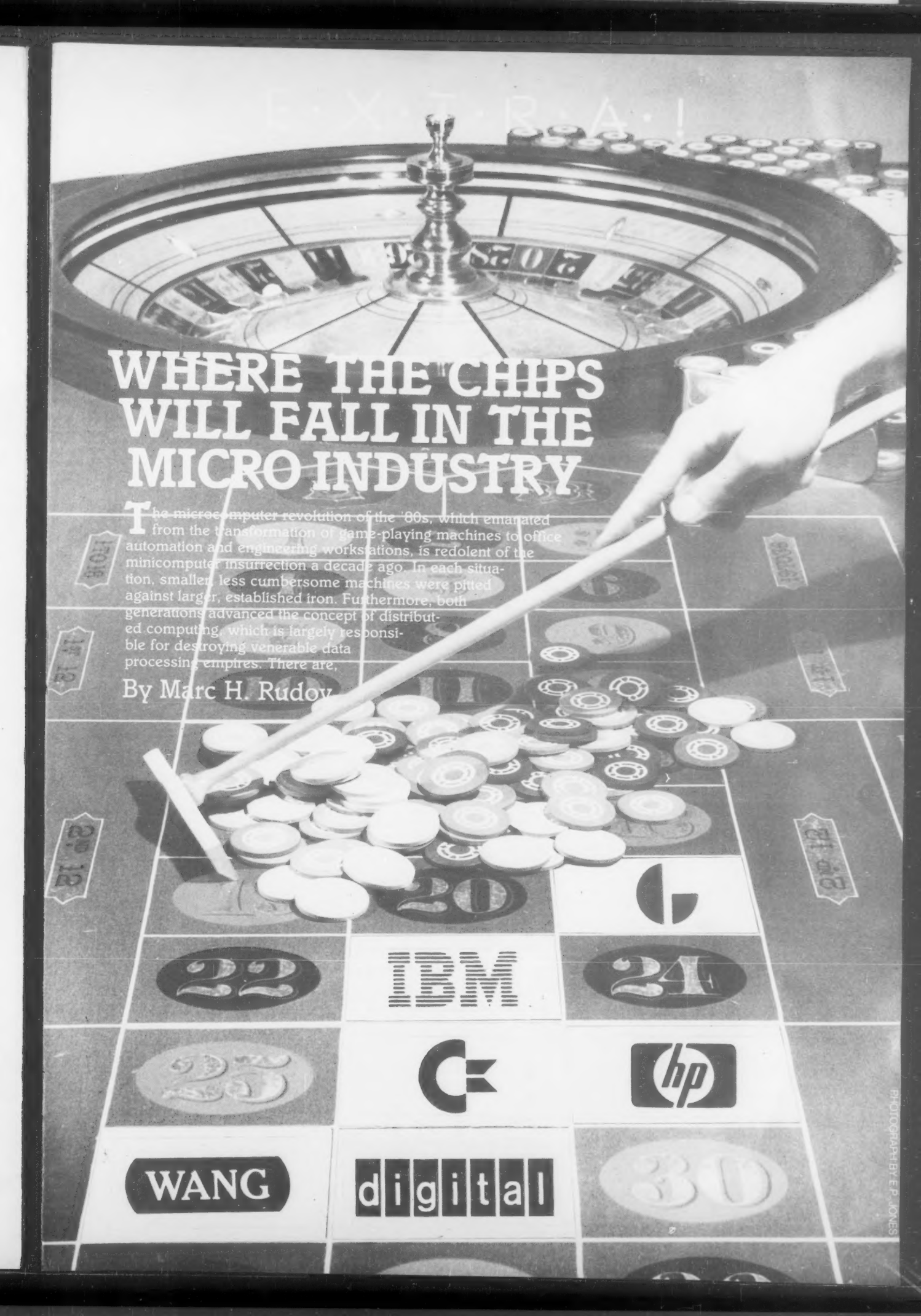

WHERE THE CHIPS WILL FALL IN THE MICRO INDUSTRY

The microcomputer revolution of the '80s, which emanated from the transformation of game-playing machines to office automation and engineering workstations, is redolent of the minicomputer insurrection a decade ago. In each situation, smaller, less cumbersome machines were pitted against larger, established iron. Furthermore, both generations advanced the concept of distributed computing, which is largely responsible for destroying venerable data processing empires. There are,

By Marc H. Rudov

PHOTOGRAPH BY E.P. JONES

MICRO MISSION

however, some notable differences.

When minicomputers entered the scene in the late '60s and early '70s, they were mostly sold to high-tech implementers without any vendor-provided programming assistance. Notwithstanding, the opportunity to touch and control a computer was a radical departure from the restrictions engineers were used to in a mainframe environment. They relished doing their own programming, system generations and system diagnostics on the new minicomputers.

As time progressed, minicomputer vendors began pushing their wares into the commercial environment. These vendors quickly discovered that business-oriented customers did not have the same fervor for programming as their engineering counterparts. Because the minicomputer vendors had no applications software to offer, their computers had to be sold through OEMs and system integrators, who custom-tailored applications programs for each end user.

Since the majority of OEMs were very poor marketers, their businesses often faltered and died, leaving many end users with no software support. Subsequently, the end users turned to the computer manufacturers for help. The manufacturers typically refused all responsibility.

With the lead of Apple Computer, Inc., microcomputers appeared on the market in the late '70s. Initially, these machines were purchased by hobbyists and affluent gadget collectors. By the time the '80s arrived, however, declining hardware prices, de facto operating systems standards and a plethora of off-the-shelf microcomputer applications software prompted many businesses to delay minicomputer purchases and seriously consider buying micros. Many of these small desktop systems were even more powerful than the minicomputers they replaced.

How could this happen again? Why were minicomputer manufacturers blind to this revolution, just as mainframe vendors once refused to believe their customers would defect and purchase minis? Perhaps the answer lies in the management of typical computer companies.

Most mainframe and minicomputer manufacturers have been founded and managed by engineers, who found it more natural catering to technically oriented data processing managers. This was reflected in the products these manufacturers produced, the people they hired and the marketing strategies they developed. Despite the constant clamoring among large computer users for vendor-supplied applications software, the cries for solutions fell on deaf ears.

On the other hand, although many microcomputer companies were also founded by engineers, they developed products with the less technical end user in mind. This strategy required their organizations to be staffed with professionals possessing consumer backgrounds — a novel and somewhat resistable concept in most technical circles.

Once the microcomputer revolution was seen to be genuine, producing shipments of 271,000 units worth $864.7 million in 1980, the astonished mainframe and mini vendors scampered to develop market share

The old aphorism, "Fool me once, shame on you; fool me twice, shame on me," is being expressed indirectly through new competitive measures taken by these and other vendors. Again, nobody wants to miss obvious market opportunities.

pirating strategies. IBM, Wang Laboratories, Inc., Data General Corp., Digital Equipment Corp. and Hewlett-Packard Co. now offer microcomputers to complement their respective product lines and sell as independent products. The old aphorism, "Fool me once, shame on you; fool me twice, shame on me," is being expressed indirectly through new competitive measures taken by these and other vendors. Again, nobody wants to miss obvious market opportunities.

It might be too premature to claim that minicomputer vendors are now market-driven, but they are making progress toward that end. In fact, they are becoming so attuned to user needs that one has to wonder what will become of the independent microcomputer manufacturers, such as Apple. If mainframe and mini vendors can produce microcomputers that operate with both proprietary and industry-standard operating systems, providing their owners the luxury of high applications programs availability, these customers cannot lose by maintaining this distribution channel.

According to Venture Development Corp., the professional microcomputer segment, which is growing 40% annually, will experience a tremendous shakeout within the next 18 months. This shakeout will occur for several reasons. First, many vendors that market IBM Personal Computer look-alikes are finding large corporations continuing to buy from

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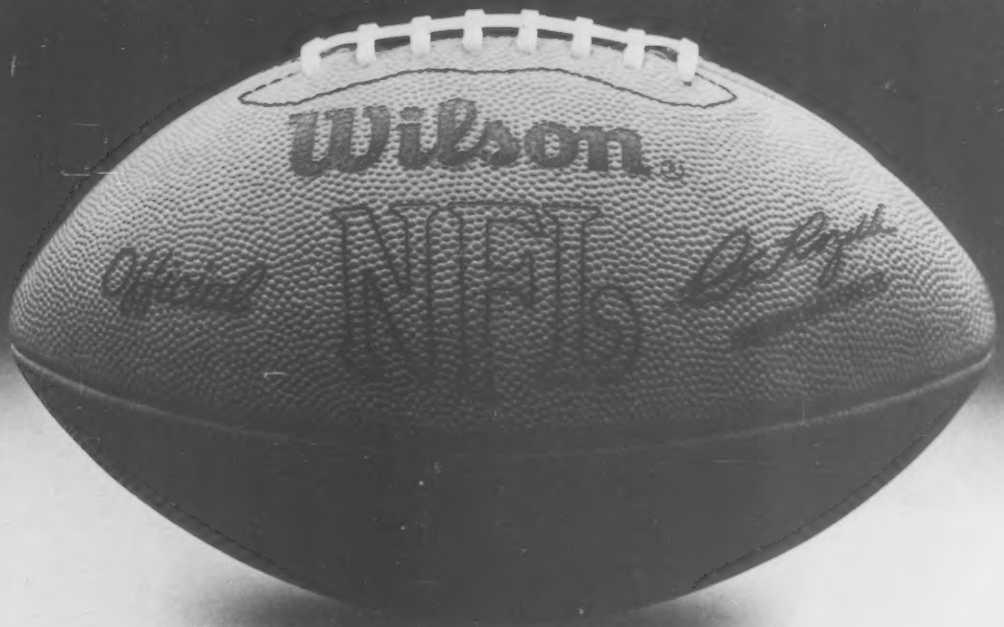

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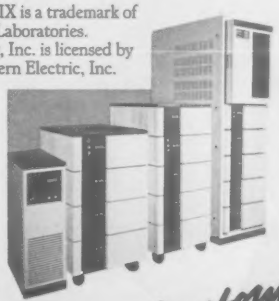

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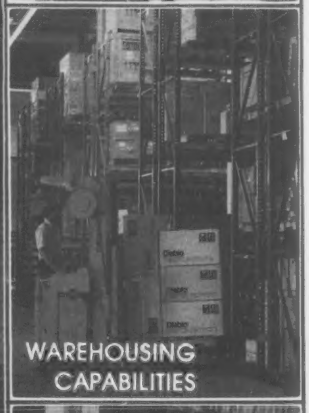

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IBM for safety reasons. With shrinking profit margins resulting from intense competition, many small vendors lacking manufacturing and financial scales of economy will be forced to drop out.

The fact that IBM currently owns more than 25% of this business suggests the importance in the Fortune 500 office of the IBM name. This is especially noteworthy, because it only took IBM two years to attain this stature. It is even more astounding that IBM will book close to $2 billion this year in micro shipments alone.

Independent microcomputer vendors, or those with no other significant products, are encouraged to look elsewhere for their customers. Hundreds of thousands of small businesses exist that would never buy anything larger than a microcomputer. They are almost always looking at the short-term and for inexpensive products. The need for a migration path within a family of products is seldom considered or required by this group.

The university environment is providing an expanding opportunity for microcomputer vendors. The days of standing in line for an unoccupied terminal at the college computer room are fast becoming history. An increasing number of schools are requiring their students to purchase microcomputers for various courses. Drexel University, Boston University, Rochester Institute of Technology and Carnegie-Mellon University are just a few examples.

Microcomputer shipments in the data acquisition market will also grow dramatically. Data acquisition systems are used in laboratory and industrial environments for gathering information from experiments and product tests. The market for data acquisition systems based on micros is increasing at an annual rate of 44.7%. There are two basic reasons for this growth. First, they cost much less than conventional data acquisition systems. Second, microcomputer-based systems can be used for multiple purposes such as word processing and laboratory budget management, as well as for monitoring and controlling experiments.

Technology has also played an important role in the microcomputer revolution. The first systems used 8-bit microprocessors as their CPUs. Today's systems take advantage of the newest very large-scale integration technology, which enables manufacturers to employ 16-bit and 32-bit microprocessors in their designs. Data General, for example, designed two separate microprocessors into its new microcomputer systems. One is used for running its proprietary AOS operating system and the other for handling industry-standard Digital Research, Inc. CP/M or Microsoft, Inc. MS-DOS operating systems.

Furthermore, new technology has advanced the design of portable and briefcase-sized microcomputers for the traveling executive. Accordingly, enhancements in flat-panel screens have reduced the power requirements for these systems.

The abundance of microcomputer users has spawned a need for these people to communicate remotely with data bases and each other through their machines. With so many different machines available, universal communications protocol for microcomputers has been developed by Microcom, Inc. of Norwood, Mass. The Microcom Networking Protocol (MNP) now appears to be the de facto standard for the microcomputer industry. In fact, GTE Telenet Corp., the packet-switching network provider, recently announced adoption of the MNP. This will enable GTE's customers owning micros to access Telenet uniformly, provided their machines have the MNP capability.

The future of the microcomputer belongs to those vendors that can both understand and accurately prejudge the activities within their respective market segments. The two computer revolutions described in the beginning of this article are examples of what can happen when assumptions supersede executions in product marketing. There is no substitution for good market research and accurate timing. Vendors that cut corners in marketing during slack periods will soon be watching the microcomputer revolution from the grandstand. ♦

Rudov is a consultant with Venture Development Corp., Wellesley, Mass.

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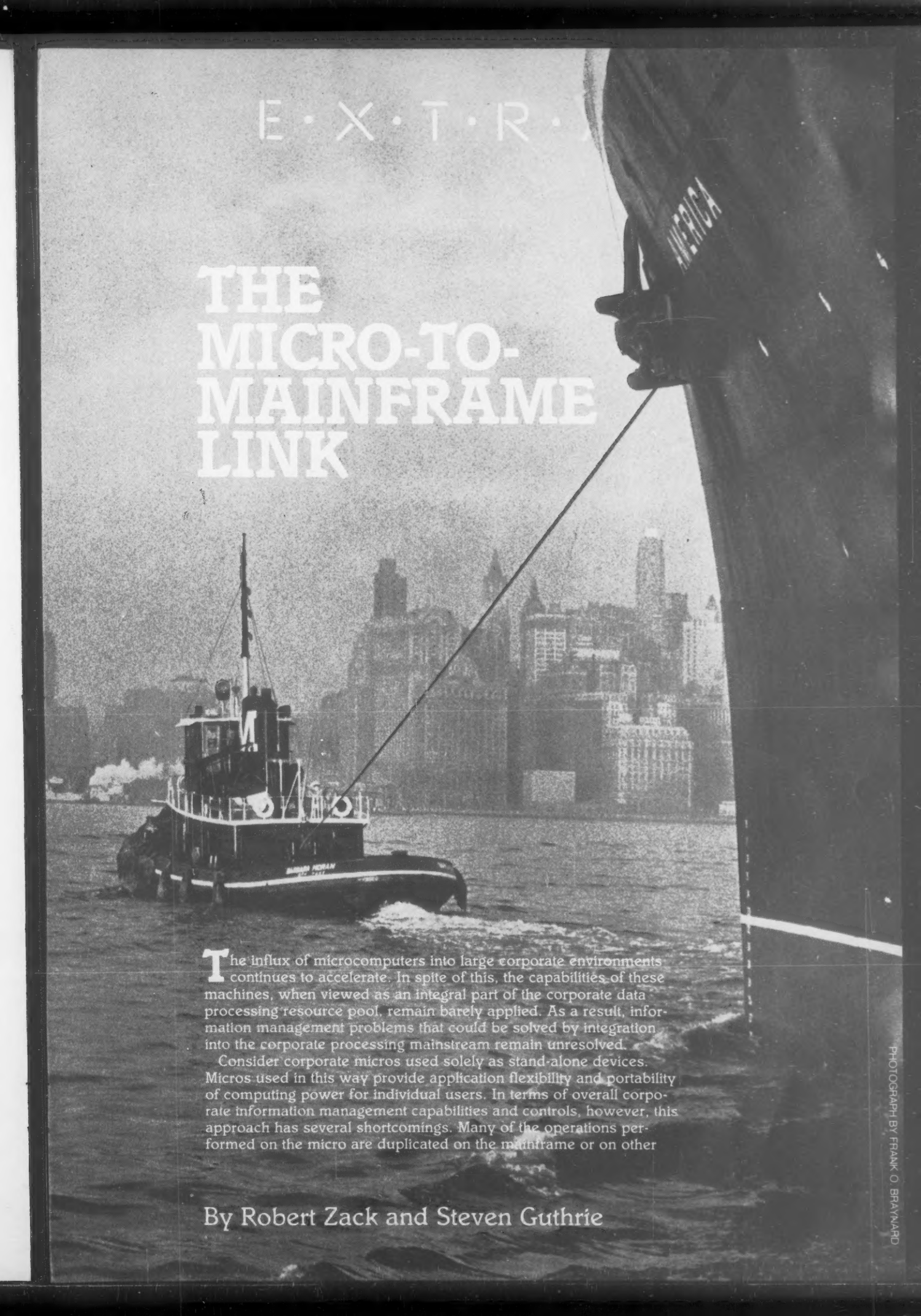

E·X·T·R·A

THE MICRO-TO-MAINFRAME LINK

The influx of microcomputers into large corporate environments continues to accelerate. In spite of this, the capabilities of these machines, when viewed as an integral part of the corporate data processing resource pool, remain barely applied. As a result, information management problems that could be solved by integration into the corporate processing mainstream remain unresolved.

Consider corporate micros used solely as stand-alone devices. Micros used in this way provide application flexibility and portability of computing power for individual users. In terms of overall corporate information management capabilities and controls, however, this approach has several shortcomings. Many of the operations performed on the micro are duplicated on the mainframe or on other

By Robert Zack and Steven Guthrie

PHOTOGRAPH BY FRANK O. BRAYNARD

MICRO MISSION

micros. Besides causing duplication of effort, this creates an uncontrollable and unreliable duplication of corporate information in various states of modification and availability.

This effectively undermines any attempts at information control. In addition, since printers and hard disks are typically not shared, costly hardware is also duplicated. Furthermore, the spread of stand-alones is difficult to monitor and control, and management information systems (MIS) personnel may be justified in not supporting them.

The greatest shortcoming is that stand-alone micros tend to be starved for fresh data. If their micro applications are to produce usable results, decision makers must operate with corporate information that is current and correct. One way to gather that information is to have a mainframe report generated and key the needed data into the micro.

This approach is costly in terms of labor, security, materials and keying errors, and the time lag involved may not be acceptable. In addition, to further complicate matters, the results of the micro operations often need to be placed back in the corporate data base, requiring even more reporting and data entry.

Some users try to overcome the time lag problem by transcribing data using a mainframe time-sharing terminal instead of waiting for reports. It is not unusual to see a terminal and a micro on the same desk. In terms of turnaround time, this approach is certainly better than the report and data entry approach, but it still has drawbacks. In particular, the cost in dollars and desk space of maintaining a terminal and a micro is quite high. Users are also faced with learning the operation of a second device. Many have moved to the first level of mainframe integration in the form of terminal emulation.

Terminal emulation hardware and software are available for a number of different mainframe and micro combinations, and they are widely used. Terminal replacement is, in fact, a major cost-justification factor for micros. The use of corporate micros as terminals provides some justification for MIS involvement in their standardization, purchasing and support.

Even with terminal emulation, there is still a need to transcribe and key data. This has led some corporations to implement file-transfer capabilities for micros. With this capability, users transfer the data needed for their micro applications directly to and from the mainframe over the same communications link used for terminal emulation. The need for manual data transfer through reporting and data entry is eliminated. This puts data control largely back under MIS control and fully justifies MIS involvement in corporate micro implementation and support.

The greatest shortcoming is that stand-alone micros tend to be starved for fresh data. If their micro applications are to produce usable results, decision makers must operate with corporate information that is current and correct.

The ability to transfer information between micros and the mainframe data base holds the potential for full utilization of corporate micro resources. Offloading information for processing on micros and uploading the results makes it much easier for micro users to get the fresh data they need. Since users are now sharing centrally stored information, the uncontrolled spread of corporate data is drastically reduced, and information control is returned to the information management division.

Shifting text processing, executive decision-making applications and other human speed-limited applications from the mainframe to more appropriate micros frees mainframe and communications network capacity for more suitable tasks. Unfortunately, file-transfer

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capabilities also raise some new questions and concerns, most of which are not directly addressed by the current crop of file-transfer products.

Security to prevent unauthorized users from accessing and copying corporate data is certainly a major concern. It is also critical to protect data from unauthorized and uncontrolled updates. The physical security of diskettes containing sensitive data is an issue. Many of these concerns can be met through the imposition of strict rules and procedures on file-transfer users. Others can be met through logical implementation of existing mainframe data access control systems.

Unfortunately, these systems are not typically designed to meet the unique needs of micro and mainframe data transfer users. Therefore, they must be applied in a sledgehammer fashion. As a result, existing information management control systems alone can provide the needed security, but only at the expense of ease of use and flexibility.

Certain performance factors must also be considered. In particular, file-transfer activity cannot be permitted to hinder production operations on the mainframe or the network. This can be handled effectively by establishing appropriate mainframe processing priorities. In fact, the previously mentioned ability to offload tasks to the micros through file transfer may improve overall system response times.

Though not subtle or efficient, it is possible to answer these and other concerns by using current transfer products and judiciously applying existing information access control techniques. However, a much better solution is possible.

Current file-transfer products have opened the door for a much better approach but, in general, have failed to employ fully the capabilities and features users really need and want. Most, in fact, simply move files. This is sufficient for some applications but makes others impractical or impossible, thereby preventing complete micro integration and use. A more extensive set of transfer tools and capabilities is required.

A complete file-transfer package should, of course, support both mainframe-to-micro (download) and micro-to-mainframe (upload) transfers. Both text data and binary data transfers must be fully supported in both upload and download modes. In some text-oriented communications systems, achieving this capability can be much more difficult than it seems. Nonetheless, the overall system is severely limited without this flexibility, so it must be available. These capabilities represent the bare minimum; full micro integration, however, requires a more thorough design.

A file-transfer request should be able to be initiated from either the mainframe or a micro. For example, with the micro running a file-transfer monitor program, the mainframe should be able to request a transfer of data to or from that micro. This feature could be extremely attractive in data acquisition and off-hour or unattended transfer applications (for instance, micro hard disk backup). Furthermore, it allows the shifting of activity to use the mainframe and network more fully in off-peak periods. This ability to initiate transfers from the host will become even more attractive as multitasking micro operating systems become more prevalent and the monitor can be made a concurrent micro task.

Security mechanisms should be an integral part of the file-transfer system. When micros are used as terminals, the restrictions of the screen applications subject users to de facto field-level security. When transferring files, these restrictions no longer exist. Thus, it may often be desirable to restrict upload and download access to specific fields in a record set. The file-transfer security mechanisms should provide transfer security down to the field level. Furthermore, since transfers can be initiated from either the micro or the mainframe, transfer controls must be provided for both micro and mainframe data. Only then can information management personnel fully secure corporate data.

The use of file-transfer profiles on the mainframe provides an excellent mechanism for implementing this security scheme. The data structure of a typical profile is shown in Figure 1. Each profile defines the record set to be transferred and contains a list of users having valid access. A profile also contains sufficient information to identify the fields that may be accessed — all fields being a permissible special case.

In addition, each profile defines the transfer record formats. Given this information, the transfer handling programs can assemble and transfer information from accessible fields in the proper format. Ideally, each profile also contains default record selection keys. The user can be allowed to override these keys and can also be permitted to select a subset of the accessible fields for actual transfer.

The profiles, therefore, act like predefined report-generation control files with optional overrides. They direct the selected and correctly formatted information to or from an authorized user's device. Users actually initiate a transfer by simply providing the transfer handling program with the name of the desired profile. Therefore, once a profile is established, authorized users can quickly and easily initiate transfers of the indicated information.

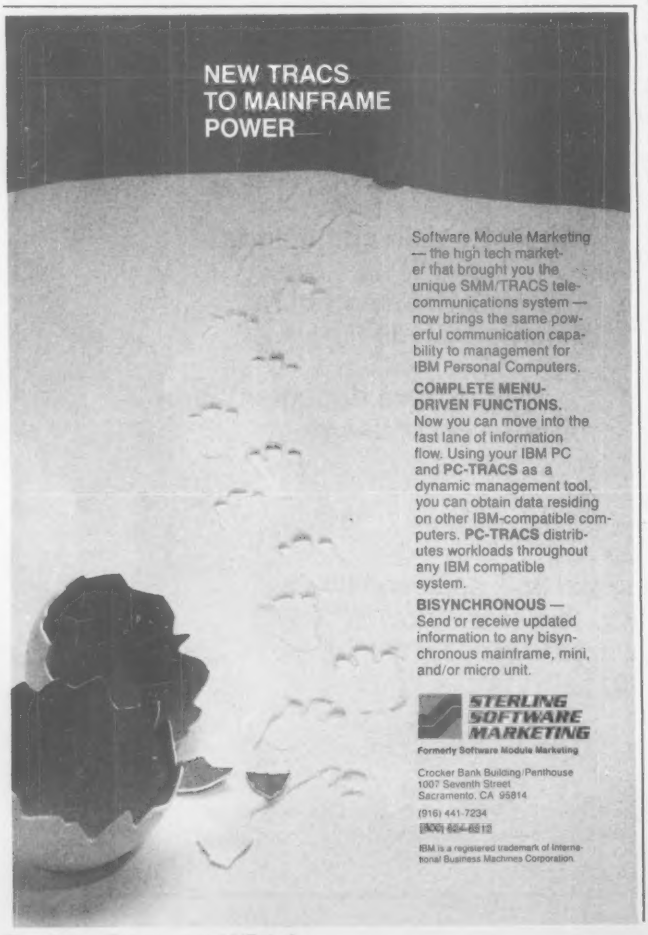
Combined with the password and information access protection already existing on the host, this profile system provides excellent security, flexibility and ease of use. Further levels of security can be added. For instance, additional password controls on transfer access can be implemented by attaching passwords to the user codes on the profile list of valid users. Each profile can differentiate read (copy) and write (update) access privileges.

It may also be desirable to deny file-creation privileges to selected users in selected areas. This can be accomplished using simple access tables in work areas.

The basic elements of a profile-based transfer systems are illustrated in Figure 2. To add to the usefulness and flexibility of the overall system,

Record Set Name
(Valid User Table) Usercode 1 / Password / Access (U, D or UD) Usercode 2 / Password / Access (U, D or UD)
(Host Format Table) Fieldname 1 / Type / Start Byte / Length Fieldname 2 / Type / Start Byte / Length
(Transfer Format Table) Fieldname 1 / Type / Start Byte / Length Fieldname 2 / Type / Start Byte / Length
(Record Selection Keys) Key 1 Key 2

Figure 1. Transfer Profile Structure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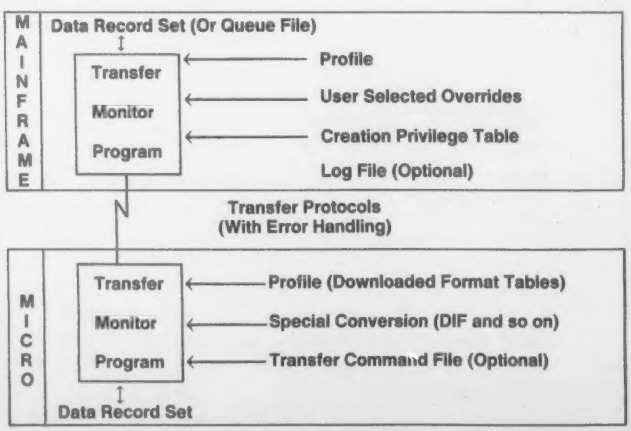

Figure 2. Elements of a Profile-Based Transfer System

the file-transfer package includes tools for translating special micro storage formats. These translators permit storage of shared files on the mainframe in a standard format, thus allowing otherwise incompatible applications to share information. Similarly, the ability to upload queue files for submission to mainframe spoolers enables micro applications to use mainframe printers as output devices. Both of these capabilities are attractive.

The ability to pass files containing file-transfer command sequences to the file-transfer handling programs is also desirable. This allows users to initiate often-used transfers with minimum keying and allows user programs to request transfers. In the same vein, the use of well-defined and well-documented transfer protocols can allow relatively simple creation of custom interfaces to the file-transfer system.

With appropriate transfer mechanisms in place, it is possible for micro programs to access mainframe data as if that data were on the micro's own disk. The user can create virtual diskettes on the mainframe, format them and read and write with them as if they were in the micro drives — but more slowly, or course. Files created on the virtual diskettes are marked to allow or disallow shared access.

There are some variations of this virtual diskette concept. Unfortunately, since these virtual diskettes are formatted, it is difficult to access their contents from the mainframe or from media-incompatible micros. The benefits of this concept can be retained while overcoming this formatting problem by using virtual files.

Instead of mounting an entire virtual diskette that requires specific formatting, the user attaches to his micro diskette selected virtual files created on the mainframe. As a result, the user's microcomputer applications can access the virtual file as if it were a standard local file.

Since the file is actually stored on the host in a standardized format, it can easily be accessed by the host and media-incompatible micros. Furthermore, information from the file can be transferred as needed using the profile-based transfer system.

File-transfer systems incorporating some of these concepts do exist for various mainframe and micro configurations. No system, however, incorporates the complete design. As a result, no system presently uses the complete capabilities of fully integrated corporate micros.

If fully implemented, the transfer system described would easily support a number of difficult or impossible applications. Since micros could securely upload and download information, data could be transferred between otherwise data-incompatible micros by way of mainframe staging files. This would certainly provide the means for electronic mail, both data and text.

Expensive printer and plotter resources could be shared between micros by redirecting output through shared areas. Combined with the ability to share word processing files, this would greatly enhance the cost effectiveness of microcomputers used as word processing stations.

Combining existing Ansi versions of programming languages for the micro with file transfer would make it possible to offload projects for development and testing. This could speed development turnaround.

Furthermore, the ability to use the broad variety of inexpensive off-the-shelf micro packages to meet many individual processing requirements can have a positive impact on existing application request backlogs.

These ideas represent only a few of the feasible possibilities for fully integrated, fully utilized microcomputers. The design outlined here opens the door to those possibilities. Therefore, corporations seeking to gain the full control and benefits of their information and computing assets should establish such a design as an integral component of their microcomputer strategies.

The tools are coming, and corporations and vendors with the aggressive foresight to plan for them will dominate in the '80s. ♦

MICRO-TO-MAIN-FRAME LINK

Zack is vice-president of product marketing, and Guthrie is a technical research manager for Digital Communications Associates, Atlanta.

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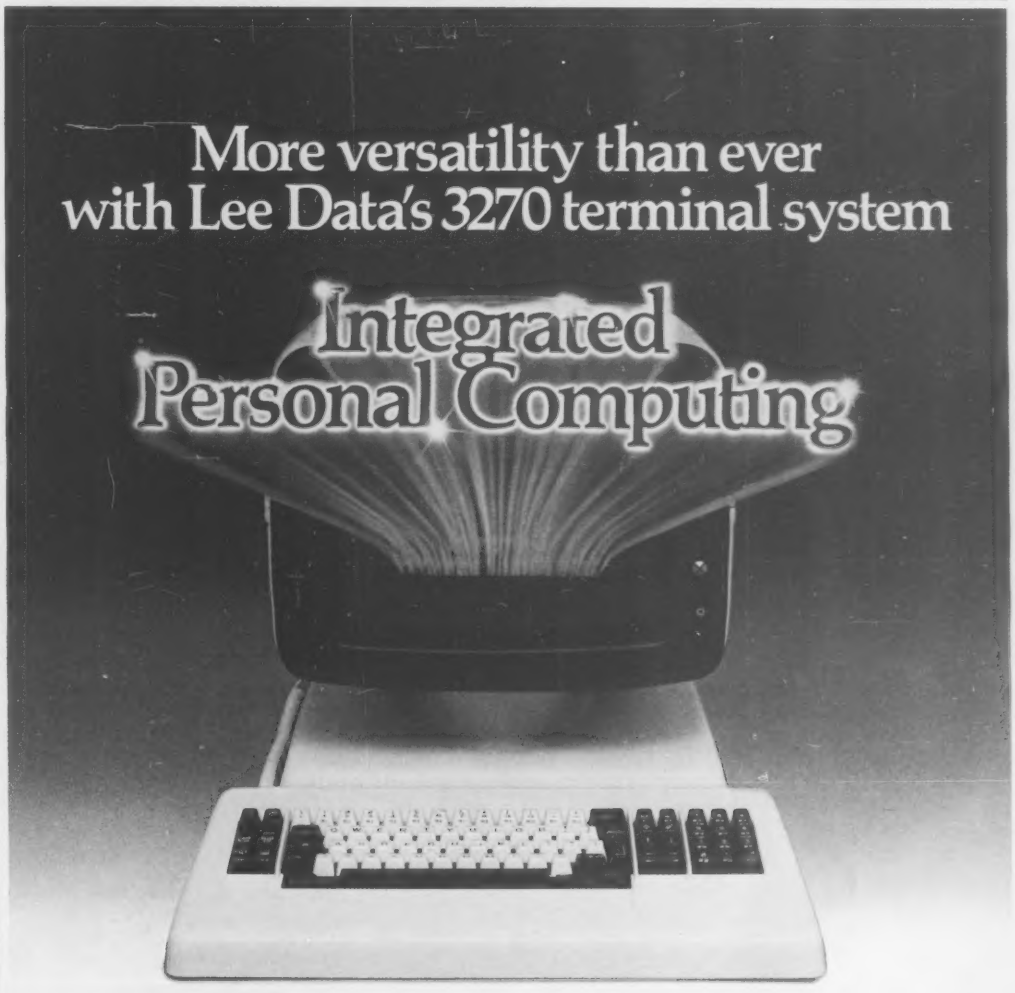

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William F. LePre is director of management information systems (MIS) in the metropolitan New York region for Arthur Andersen & Co. He has been in the data processing industry for 23 years. In his capacity as MIS director, he is responsible for all internal data processing, including personal computer coordination. LePre is also on the board of governors of the Microcomputer Users Group, which consists of 25 companies in the metropolitan New York area.

William L. O'Neil is director of microcomputing at The First Boston Capital Group, Inc., Tarrytown, N.Y. With two people under him and nine consultants working with him, he is responsible for every aspect of microcomputers, including research and development, software and operational support. He owns $40,000 worth of his own microcomputer equipment and holds an honors degree in artificial intelligence.

WILLIAM F. LePRE

WILLIAM L. O'NEIL

PHOTOGRAPHY BY ED BRAVERMAN. DESIGN BY GARROW THROOP

TABLE

Gary A. Schnorr is manager, micro systems support, at General Foods Corp., White Plains, N.Y. He has been involved in General Foods' microcomputer program since its inception 2½ years ago. He helped set up the firm's microcomputer center and is currently supporting that center throughout General Foods. He is also on the board of governors of the Microcomputer Users Group.

Matt Fitzsimmons is owner and manager of Computerland of White Plains, N.Y. He is also an adjunct professor at Pace University, where he teaches MIS. He is program director and a founder of the Microcomputer Users Group.

GARY A. SCHNORR

MATT FITZSIMMONS

It wasn't long ago that the proliferation of microcomputers — or personal computers — built to the point of "explosion," a term commonly used to describe their burgeoning popularity. In the wake of the explosion, micros have begun to assume their rightful position in the work places of the world.

This Computerworld Extra! *roundtable was organized to examine the new roles of micros and shed some light on where they are and where they are headed. This new generation in computers has brought with it a new wave of problems and users. For instance, security is more important because micros can be picked up and moved by anybody.*

A lot has been said and written about linking micros and mainframes, but how many organizations are actually doing it? Networking is another hot topic, but who's really doing it and why?

It may seem strange to some old-time DPers, but a generation of computer users that were weaned on microcomputers is presently coming of age. The members of this generation have different expectations and aspirations than their predecessors. Their fresh attitudes may put them in an advantageous position.

We called together a diverse group of experts charged with leading their firms' efforts in the microcomputer area to find out where they stand on the issues. They sat down at the behest of Extra! *Editor Bruce Hoard and took a couple of hours to hash over the pertinent points of their micro programs, running the gamut from acquisition and implementation to security and training.*

Let's start by talking about security.

Fitzsimmons: A fellow said to me the other day: "If you have a hard disk in a micro and you walk in and it is gone, it is almost like a data processing manager walking into the machine room and finding it completely empty."

The point is that my hardware, my peripherals, my software and, most importantly, my data are gone. To say, "Well, I backed up my hard disk on a tape," is probably not good enough if you have sensitive data that is on that hard disk. It is probably now out of your control and out of your firm.

LePre: Security is an issue. Ironically, it is amazing. We have not had a machine or a component disappear.

Anyway, way back when, I designed a lock for the personal computer — the access, the actual entry into the back of the personal computer where the key head and the cassette recorder are one.

Well, I designed a neat little lock that made it impossible to get into the machine. Then I contacted a company in New Jersey that made tamperproof screws with a special tool. All of our 64 New York office machines have those special screws on them. Whenever we need service, we have to go around with this special screwdriver or adapter to get access to the machines. We didn't tie them down with the plate and drill the holes.

We did set up a procedure so that if you are using a pool machine, you draw the key to the lock of that machine and the key pad. You give your ID card, use the machine and secure it when you are finished. Then you return the key pad and the key and you get your ID card back.

Schnorr: The security of the physical device and software is the responsibility of the machine's owner. And it ranges — managers are responsible for the equipment, they are responsible to make sure that their data is secure and that access to the equipment is secure.

It ranges from a locked office to the anchor pads, key pad, locking a machine down, bolting it to a table, securing the software in locked cabinets.

Most of them have identified someone in their organization that has additional responsiblity associated with keeping the machine in place, maintaining it, assuring that it is locked at night and that the room is locked.

So far, we haven't had any problems. We haven't lost a piece of equipment. I think the worst case we had was when someone crashed a floppy disk.

O'Neil: We make each person responsible for his own personal computer, be it on his desk or in an associated area or even in the home.

We have on-site security with a security network here in the building. Fortunately, we have never had anything stolen either, but it can be a real bad problem.

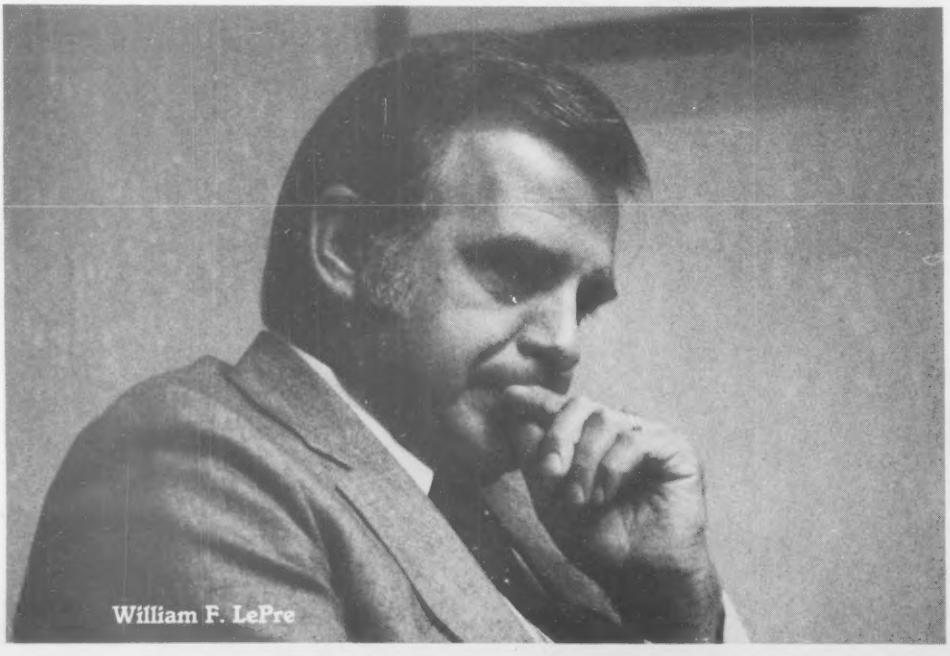
Protecting the data is also a problem. When we bring the clients in, we train them about some of the things that can go wrong, about how you can destroy a disk, about hard disk crashes and so on.

Matt Fitzsimmons

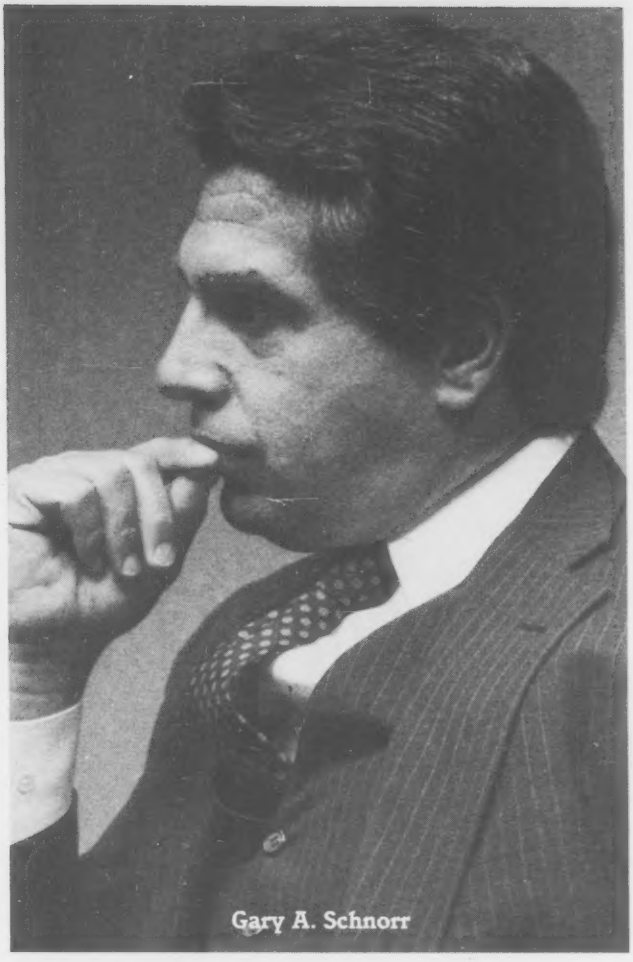
Let's discuss information centers. A lot of people have different ideals about what they are and what they do. What are their strengths and weaknesses?

Fitzsimmons: The information center concept involves a situation where people set up terminals in a room and try to get end users to come in and do their own programming using some kind of data base retrieval language. The [management information systems (MIS)] department would have to write the data manipulations programs, but the end users would manipulate the data, structure their own reports and print it out.

My opinion is that the concept did not work. The reason is the complexity of software. It was more than



William F. LePre



Gary A. Schnorr

most end users would tolerate.

Therefore, the whole idea of information centers was to offload the work that was put on program analysts, to get the more routine tasks in the hands of the end user.

In every company, there are a few sophisticated users that can handle it. On a percentage basis, there are not many people who could come in and effectively use an information center.

A micro seems like an extension of that information center. Unfortunately in some cases, the information center has such a poor reputation that many people felt it would taint the reputation of the micros. So, they said all micros would be in completely separate organizations.

Other companies were relatively successful with information centers, and, therefore, they incorporated micros.

LePre: We are setting up a resource center now. It is a pretty neat idea. It is or will be a subset of our professional education development area.

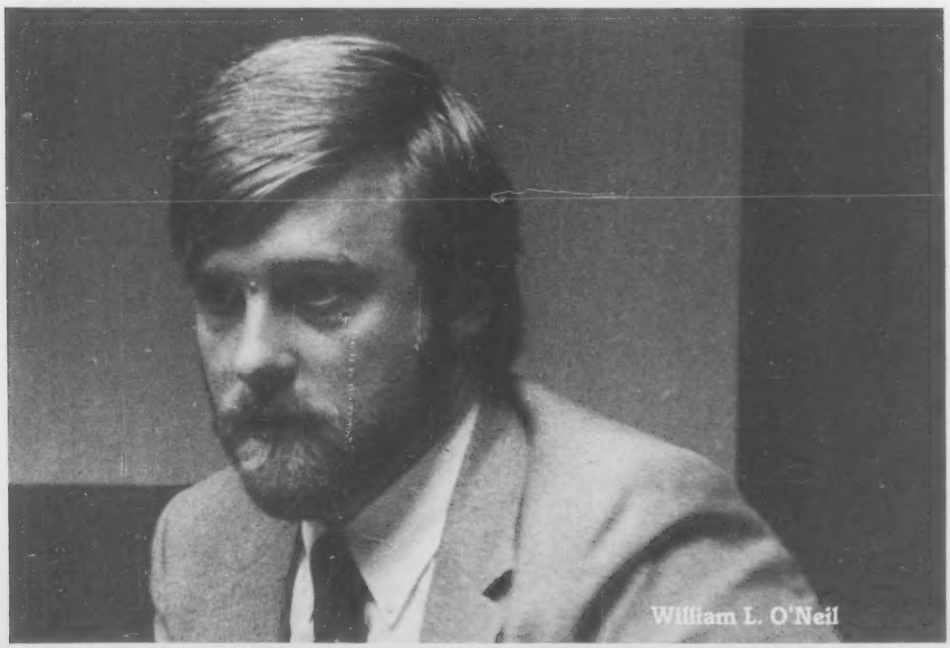
Schnorr: We have been supporting end-user computing for years, probably before IBM coined the term "information center." The idea is to have some means for users to have access to the information that resides on the host of time-sharing computers.

Our approach now is to look at all of our users as potential clients of either personal computers, time-sharing or any of the other facilities that we provide.

What we are doing is setting up technology centers providing facilities in both our major locations in Westchester County, [N.Y.], where we will display not only personal computers but also computer graphics systems. We will look at things like teleconferencing facilities, videotex, workstations and executive workstations. We want to make those centers showplaces where we can show people what we see down the road and what types of things are available today. We are taking more of a marketing approach to getting to the user base.

Let's discuss networking. How are you going about networking? What problems are you having with it? Do you find that vendors are able to supply the solutions for local-area networks? How do you view that particular situation?

O'Neil: When I approached local-area networking, I went to look for books that were written 20 years ago. What were the first problems with the IBM system? How do I protect the data to say that this guy is in an update mode? How does this guy pull the record and get it ready to put back because I need that information also?



William L. O'Neil

MICRO MISSION

Fitzsimmons: It seems to me you are trying to make communications completely transparent to your end user, so he doesn't know that the machine is communicated.

O'Neil: That's exactly right.

Schnorr: My situation is that most of my users have no interest in networking or don't even know what it is right now. And they are not driving the situation. We are going about it cautiously and slowly.

There was a need for a particular person or group of people within an area that had some information that needed to be processed more effectively. The micro was put in to support that. There wasn't a need for tremendous amounts of information from outside sources or even from sharing data within that group.

We will do networking in a prototyping situation. We will be setting one up in the next few months. We wired our new headquarters building in anticipation of networking, but to date, we do not have any local-area networking in place. We are taking our time in evaluating it.

Fitzsimmons: I am not convinced that a personal computer has the capability to do networking effectively.

The few people I know who do network tell me it is really brute force when they copy a hard disk onto a personal computer. I don't know anyone who is doing truly interactive processing by way of a networking arrangement.

Do you find that networking is still in the dark ages? You know, I have been to these silly discussions about what kind of wire runs through the wall and the network.

I can't believe that this whole industry is being reduced to a pedestrian problem of what kind of wire is going to run through the wall.

Schnorr: I don't think it is in the dark ages, but in its infancy. There are good networking schemes out there. Some of the ones that are on the market provide the functionality that the manufacturer is trying to sell.

And we are probably about a year away from the introduction of some very interesting products in the networking area.

I think one of the things that will make a difference is if IBM finally comes out with a networking scheme. We will hold off until we see what that is or what Systems Network Architecture is going to be supporting.

What impact has the microcomputer explosion had on data processing professionals?

Fitzsimmons: I have had better luck hiring people who are not true

experienced data processing people, who have learned something about computers in school, who have the interest, the desire, the motivation and none of the bad habits.

Schnorr: I have had a similar experience. I think DP people tend to bring a complexity to it and try to spend so much time relating the micro to other pieces of equipment that they have worked with or other experiences that they have had.

Fitzsimmons: Think about that youngster coming to work for your company who literally has ten years' experience with computers. You are going to sit down with him and say, "Wait, you cannot touch that program because I am a Cobol programmer and I — only I — will manipulate that data."

Schnorr: And in ten years when these sixth and seventh graders are out of school, when they come into business, they are going to expect something on the desktop.

Fitzsimmons: I see this whole thing putting pressure on the MIS professional to be more professional, to develop expertise in data base and large-scale systems development and the other data manipulations. And this means that all those people in the middle could be in very deep trouble.

LePre: Take a look now at how the DP or MIS professional is having a more meaningful say within the firm.

It is amazing. You are actually seeing MIS professionals becoming a major part of the senior management firm.

O'Neil: You are absolutely right. Where at one time it was only controllers . . .

LePre: You were a like a back door troll.

O'Neil: Well, that is because they used to lock computers away in a back room someplace and only a certain select few had the combination to get in.

Fitzsimmons: The MIS professionals will have to give up some of this power that they have assumed over the past few years. They are going to have to begin to turn that over to the end user.

Schnorr: It has always been the users' information. And now, through distributive processing and personal computers, we are seeing people recognizing that they can handle their own information.

I think our responsibility as managers, MIS people, is to provide a certain amount of knowledge to those users along with our experiences.

A lot has been said about senior management's reluctance to accept personal computers. Have you people found there is a reluctance among top management to accept this technology on a personal computer?

Schnorr: I don't think top managers are ever going to be users of personal computers in the sense that most people use them today. They certainly are not going to be involved in programming. They are decision makers, not information processors.

Consequently, whatever device ends up on their desk or in their office is going to be something that can give them information when they want it in a simple form. It is not going to be the personal computer.

Fitzsimmons: I find the senior managers are interested in the technology. They want to know what it can do for them.

Schnorr: They are interested because they see the potential for that type of thing down their organization. They see that a lot of tasks are being done manually in the grass roots of their organization. This probably could be done a hell of a lot more effectively. They are looking for solutions to those problems because those problems are their problems.

Consequently, they are interested in the technology, not necessarily for their desk.

Fitzsimmons: And they are also willing to just sit down and hit the keys. There is a school of thought that says that senior managers won't type — never.

Schnorr: The chairman of the board used [Visicorp's] Visicalc a few months ago, and he had a very good time at it.

O'Neil: I am pleased over senior management's idea that could make our system work on a micro, to dedicate it to a micro. When you decentralize with micro processing, it is in each individual office. The office is 1,000 miles away or 2,000 miles away. As a result, it was a big step for our management, the senior vice-presidents and president, to say, "It is going to be done on the micro, and I am pleased to be part of it."

Schnorr: We all are. All of us probably had a personal interest in it before we got involved in it.

Fitzsimmons: They either have to accept these micros, learn how to manage them or we are going to

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60 Government—State/Federal/Local
65 Public Utility/Communication Systems/ Transportation
70 Mining/Construction/Petroleum/Refining
75 Other User _____
Vendors
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85 Computer Service Bureau/Software/Planning/ Consulting
90 Computer/Peripheral Dealer/Distributor/Retailer
95 Other Vendor _____

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12 VP/Assistant VP
13 Treasurer/Controller/Financial Officer
21 Director/Manager/Supervisor DP/MIS Services
22 Director/Manager of Operations/Planning/ Administrative Services
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
35 OA/WP Director/Manager/Supervisor
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41 Engr/Scientific/R&D/Tech Mgmt
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60 Consulting Mgmt
70 Medical/Legal/Accounting Mgmt
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Types of equipment with which you are personally involved either as user, vendor or consultant
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B. Minicomputers/Small Business Computers
C. Microcomputers/Desktops
D. Communications Systems
E. Office Automation Systems

have some big problems. Senior management knows it.

LePre: And we are making sure that senior management knows it.

What have you been doing in the area of training and education?

Schnorr: The training courses that we began were on Visicalc. They have expanded now to other spreadsheet programs, graphics, word processing, communications, data-based programs — initial setup and introduction to the machine, what it is and what it does.

And that was twofold: a top-down, bottom-up approach to training. The training program began with an executive awareness program.

We purchased equipment for senior management to use for a period of anywhere from four to six months. We gave them some hands-on training for a day or so, showed them how to use the machine and provided them with a certain amount of software, normally Visicalc. We also gave them some game packages, a data base program and possibly communications if they had any interest in getting into something like [Source Telecomputing Corp.'s] The Source or Dow Jones [& Co., Inc.'s News/Retrieval Service.].

Between the people in the Westchester area and the field locations, we've probably trained over 3,000 people now in hands-on sessions — that is, everyone with their own personal computer in front of them.

LePre: We started our training program from the top down. We have, as part of our audit provisions, professional and educational divisions within a division. It is quite an elaborate training program for both clients and in-house people. Our training program started out with the partners. Now, almost every partner has been through the training, certainly the greatest majority of them. We've gone from senior managers to managers, down to senior staff.

O'Neil: The area of education in which we feel we have done well is in encouraging the production development staff to bring the personal computers home. In so doing, they learn the uses of the microcomputer system and then bring that education back to the job with them. Our productivity level is high here because of this approach.

What kind of utilization program do you have?

LePre: We have set up a pool concept. The pool supports equipment breakdowns, meaning we will go out and literally swap-out a component. For example, the pool supports an overworked user. He will come in, give us a charge code and sit down at a personal computer for "X" period of time at an established rate — hourly, daily, weekly, whatever — and we will support him.

Schnorr: Actually, our program began prior to the release of the IBM machine, so we didn't know what the box was going to look like at the time. We have some Apple [Computer, Inc.] and Radio Shack units in place. Our approach to support a micro was one more driven by the software.

We have continued that policy. We are still looking more at the application first, identifying the best way to satisfy that application, which may or may not be with a micro at all. In that case, it is moved to the time-sharing environment or to the host environment.

More and more, the migration now is toward the IBM Personal Computer, but organizations that have Radio Shack equipment in place continue to purchase some Radio Shack equipment.

Fitzsimmons: As I recall, Gary, you had a five-year plan that General Foods put together. You went through giving everyone A, B and C priority projects: A, the resources; B, if anything falls out, we will get resources; C, the projects that never get done. As I recall, you looked at the Cs and tried to figure out how many of those are candidates for micros.

Schnorr: Exactly.

Fitzsimmons: What percent of those did you find actually ended up on a micro?

Schnorr: More than half were probably suited for micros. Some of the others were resolved through other means — better administrative controls and that type of thing — but a good percentage of them fit the micro environment.

We didn't say, "This is your manager. This is your micro." Our support of micros was more toward a machine that was placed in an area for a functional group. We exposed as many people as possible to it. And that was to leverage the amount of equipment that we were placing in the organization.

What software are you using here and what kind of decisions went into acquiring it?

Schnorr: We support certain packages — the spreadsheets, the graphics, the data base and the other programs — but we haven't limited ourselves in saying that those are the only packages we will support.

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packages, and then we also provide a library or research function so that we will stay abreast of what is happening in the industry. We look at new packages as part of our center. We purchase the program and review it to see if it has applications. Recently, we looked at [Software Arts, Inc.'s] TK Solver, and in the process, we did a review in our newsletter.

O'Neil: We make recommendations to the customers in word processing, spreadsheet, accounting and data base.

An extensive analysis went into each one of them. We broke down each of the packages depending on their needs. Some make better workstations, some spreadsheets, some accounting packages. Some are better than others.

As an example in the accounting packages area, we analyzed seven before we chose one. Our approach is to see what we can fit on the micro first and how it interacts with the mainframe.

Let's talk about hardware.

Fitzsimmons: Who would have thought that Osborne [Computer Corp.] would all of a sudden lose business? A year ago they were a high roller. How many people can vouch for them? It gets into this same issue of hardware.

Schnorr: I think we are going to see a shakeout.

Fitzsimmons: Do you think people are concerned about the 120 companies that may end up as less than 20 a year from now? I find companies are reluctant to throw their weight with any one manufacturer other than the obvious IBM, since that would put them right in the mainstream for years. Users are hesitant to go with another manufacturer, because they simply don't know if that company is going to be here a year or two from now. Also, they don't know about the support required for maintaining multiple machines, different operating systems and all those types of problems.

Schnorr: I don't ever see us going beyond three manufacturers. It may not be the three that we have now. We have already dropped support of Radio Shack equipment other than what is in place. We will not place any new equipment, but we will continue to support Apple and IBM on a long-term basis. We have a very strong base in Wang [Laboratories, Inc.] equipment.

When the shakeout occurs, it is going to be with a lot of fringe manufacturers — firms that have a box that may be a very good, but have not been an established mainframe computer manufacturer.

O'Neil: Take a look at IBM with its availability problem. I can think of eleven multifunction cards. Now everybody has the multifunction cards. They get their warehouse stocked and say, "Buy mine, buy mine, buy mine," and there are no machines to put them in. ♦

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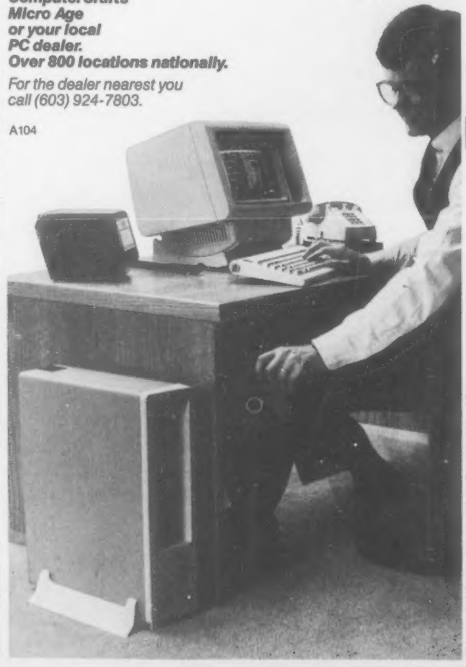

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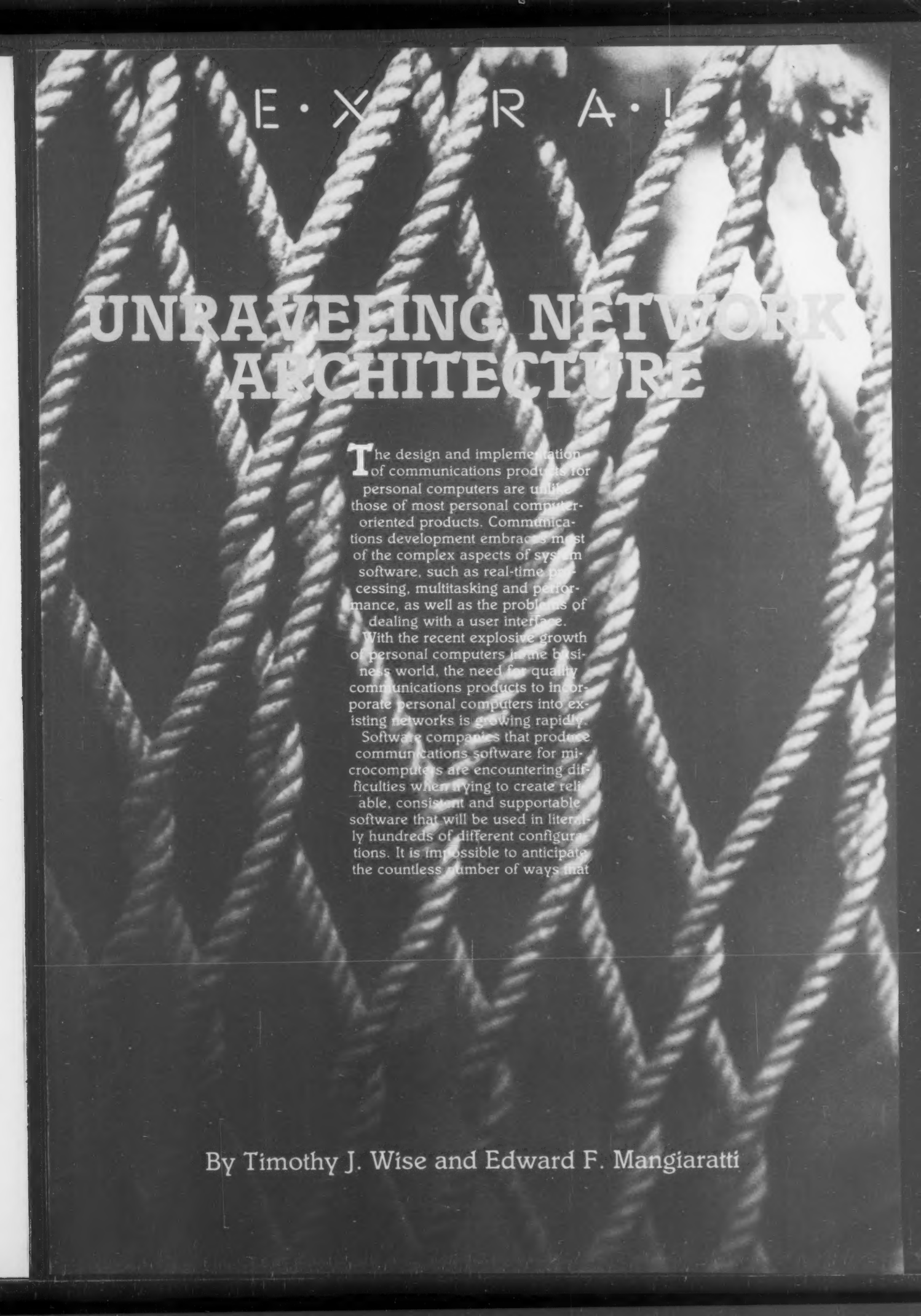

UNRAVELING NETWORK ARCHITECTURE

The design and implementation of communications products for personal computers are unlike those of most personal computer-oriented products. Communications development embraces most of the complex aspects of system software, such as real-time processing, multitasking and performance, as well as the problems of dealing with a user interface.

With the recent explosive growth of personal computers in the business world, the need for quality communications products to incorporate personal computers into existing networks is growing rapidly.

Software companies that produce communications software for microcomputers are encountering difficulties when trying to create reliable, consistent and supportable software that will be used in literally hundreds of different configurations. It is impossible to anticipate the countless number of ways that

By Timothy J. Wise and Edward F. Mangiaratti

communications devices are going to be used. The problem is compounded by large corporate communications networks built using a mix of protocols.

Some of the successful approaches to building complex communications products in the past have not proven effective for developing similar products on the current generation of personal computers.

One example of a successful approach can be illustrated by the development of an IBM 3270 Information Display System emulator from Pathway Design, Inc. The IBM 3270 family of communications products has been the de facto mainframe standard for years. A complete line of 3270-compatible terminals, printers and cluster controllers is available from many companies for attachment in communications networks. Products that allow various personal computers to connect into networks — both Binary Synchronous Communications (BSC) and Systems Network Architecture (SNA) — and to emulate 3270 devices are just now becoming available.

It is not easy to build products that emulate the IBM 3270 product line. There are many obstacles that must be overcome to provide a robust product that will instill user confidence in its completeness and correctness. The product requires hardware and software that must be integrated to provide the optimum solution from a cost-performance and flexibility standpoint. However, the various forms of available hardware solutions from different personal computer suppliers compound the problem.

There are now over 100 personal computer manufacturers. Even though a majority are using either the Zilog, Inc. Z80 or Intel Corp. 8088 microprocessors, the many different configurations of memory and peripherals introduce significant portability problems. Volumes have been written on the merits of portable software, but the very nature of the personal computer market has given that term new meaning.

The correct architectural rules must be applied and adhered to if portability is to be achieved. Portability is not typically a primary concern of the user population. However, it is increasingly important to the developers of products to reduce costs in providing products across a wide vendor base.

To follow the implementation of SNA on a personal computer, examine the IBM model of SNA layered communications:

- End-user services.
- Network services.
- Presentation services.
- Data flow control.
- Transmission control.
- Path control.
- Data link control.

Each layer performs a limited number of coordinated functions that together create the SNA environment.

In an SNA environment, functions within each of the layers are likely to be performed concurrently. In a multitasking operating system, each layer could be implemented as a task. Since the current popular operating systems — Digital Research, Inc.'s CP/M and Microsoft, Inc.'s MS-DOS — do not provide multitasking, alternatives have to be evaluated for the implementation of an SNA emulator.

Both operating systems are small and do not impose any significant restrictions. Therefore, it is a simple matter to create a small multitasking environment within the confines of a single program.

This approach is hindered by the performance and memory capacity of the personal computer. However, the newer, professional class of personal computers, with large memory capacities and faster processors, will go far in alleviating development and support problems.

The primary components of a multitasking system are a scheduler/dispatcher, intertask communications services, interrupt handlers and the tasks. The scheduler/dispatcher should be designed to follow the performance bottlenecks associated with the data flow as it passes from task to task. As long as the scheduler/dispatcher is kept simple, it will usually migrate to new system architectures with relative ease. A difficult aspect of building a portable dispatcher is keeping the functions of the dispatcher separate from the function of the tasks.

Many implementors will

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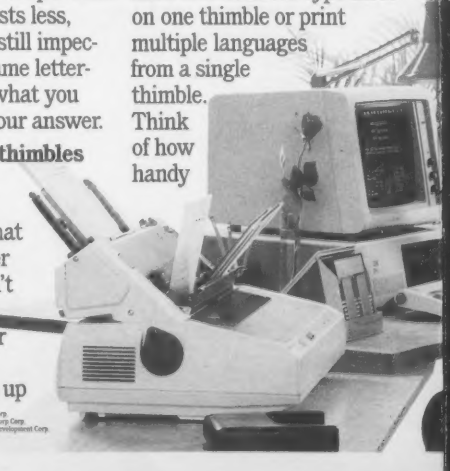

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be tempted to mesh the scheduler/dispatcher functions closely to the tasks, but this will lead to significant problems as the product continues its evolution.

The intertask communications services should also be kept simple, straightforward and task-independent. For enhanced performance, pointers to the data should be used rather than physical data moves between tasks. This implementation-specific architecture should not be known by the tasks that will be using the intertask communications services. The maximum size of each message should be kept to a reasonable length — for example, 256 bytes to 512 bytes.

When building a multitasking system of this type, keep in mind that the software may be moved to a larger, full-function operating system in the future. Larger operating systems typically impose greater restrictions on the availability of shared memory, shared code, message size and dispatching queue ordering. These restrictions must be kept in mind when designing a multitasking environment that will increase portability.

Therefore, the implementation of the system can be achieved by having each task structured as a subroutine where the scheduler/dispatcher determines which subroutine or task is to be called. By keeping the interfaces clean, migration will not pose any difficulties.

Starting from the bottom of the SNA layers, the data link control layer is the first to be implemented. IBM defined a specific protocol, Synchronous Data Link Control (SDLC), for use in its SNA architecture. SDLC is SNA-independent, and other protocols can be substituted, although it has rarely been done.

SDLC is easily implemented by dividing it into two sublayers: physical and logical. The physical sublayer is concerned only with the management of the communications hardware, the electrical interface and the media. This includes RS-232 signaling, block code checking for error recovery and the processing of the data being transmitted or received. This is also typically the first layer to interface to the memory management and intertask communications primitives of the multitasking operating system.

The logical sublayer is the processing of an error-free frame by SDLC. An address byte, control and optional data are in the frame. This layer will determine the disposition of the frame and send it up to the next layers. Likewise, it will determine if the upper layers have completed any work for the host and will apply the appropriate framing around the data and send it to the host when polled.

By keeping these two sublayers separate, the effort to migrate to a new system is simplified. Typically, only the physical sublayer will have to be rebuilt due to hardware or language differences. The logical sublayer should be kept immune to these changes and is typically implemented in a higher level language. Performance is still a key issue at this level, since SDLC messages are timed by the host.

If the emulator takes too long before responding to an outstanding message, the host will continue to the next station on the network and try again later. Such timeouts will be logged as errors and might cause the host to shut down the offending line if it occurs too often during the course of the day.

The next layer, path control, is well-defined and straightforward to implement. There are no time-critical events from this point upward, although the system must be performance-sensitive in order to gain user acceptance. In this layer, the incoming frames are logically linked together and routed to the proper SNA session. This layer is still independent of SNA commands and must adhere to a simple set of rules.

At this point, the SDLC and path-control specific information on the frame may be eliminated, since the upper layers do not use any of the information. Rather than eliminating the SDLC and path-control fields, they can be reused by the intertask communications system for passing control and synchronization information between the tasks. The scheduler/dispatcher should not be task-sensitive. It is the task's responsibility to synchronize the SNA-related

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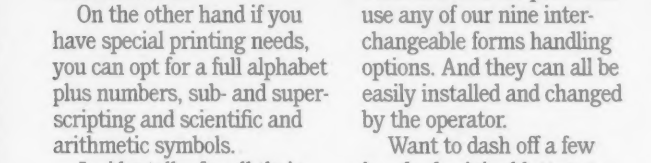

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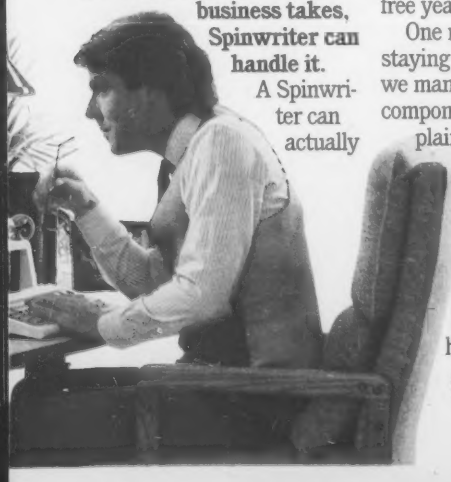

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events. Any aid that the multitasking system provides should be kept generic to each task.

While SNA has always been presented as a layered architecture, there is actually a fair amount of smearing between the remaining upper layers. The transmission control, data flow control, presentation services and network services are severely coupled in a true SNA environment. This complicates implementation in that the optimum solution requires shared data constructs between the layers. But some operating systems may make sharing data difficult, if not impossible. Care must be exercised in the selection of an architectural solution.

One favored way is to hide the data construct via procedure calls. Obviously, this method produces a fair degree of overhead, in both memory size and processor speed. A compromise entails a procedure that returns a pointer to the data structure for the session in question. If the multitasking system does support data sharing, then the routine merely returns a pointer to the session table.

If data sharing is not supported, the routine could hide this by obtaining a copy of the session information and allow the layer to modify the local copy. Eventually, the layer would be finished with the session information and could return it to the master copy. Access to a particular session table would be managed by semaphores, keeping the table synchronized.

To complicate matters more, path control and transmission control may bypass adjacent layers and pass data directly to the network services layer.

The functions performed by transmission control, data flow control and network services exceed the scope of this article. A high degree of familiarity must be achieved by the design and implementation team before making any architectural decisions regarding these layers. Although IBM has several significant documents covering SNA and its implementation, the architecture is incomplete. There are many gaping holes that will become traps for the unwary.

This was not intentional, but SNA is such a large, complex communications system that it was inevitable. The documentation can only be used as a guideline, and many hours of host time are necessary to reverse-engineer some portions of these layers.

The end-user layer performs the 3270 emulation and is well-defined in its functions and services. With only small additional effort, this layer can be designed so large portions of code can be shared when used in a BSC environment.

The greatest difficulty in architecting the end-user layer is that the status line contains information maintained by the lower layers, such as the condition of the communications line. An architectural decision must be made about which layer should control the status line information and its presentation on the display. The most portable and easily supported approach is to keep all display functions isolated in the end-user layer. The lower layers are concerned only with the proper transport of data between two end points.

Only the lowest layer and highest layer have any device specificity. All the other code remains completely untouched in the majority of migrations to other systems. This is a significant departure from typical communications product development. This approach provides an increasingly stable base for adding new functions and services. IBM is constantly adding new services to SNA. To even stand a chance of keeping up with IBM, a third-party supplier must build a modular, supportable migratable system.

By properly building an architecture for a system, vendors can gain greater confidence in their products and can begin to offer significant support options. The only way to create supportable, acceptable and successful products is to exercise care and deliberation in the design process, to create experimental code to test an architectural premise and to consider all the options in the user environment.♦

Wise is vice-president, research and development, and Mangiaratti is vice-president, manufacturing and support, at Pathway Design, Inc., Wellesley, Mass.

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Writing with the Processed Word

It is an indisputable fact that the growing popularity of personal computers, in particular the IBM Personal Computer, has caused the most dynamic growth in the history of the software industry. The vast number of software products available today boggles the mind. The word processing marketplace undoubtedly has experienced the major brunt of this force. Keeping abreast of the latest products and industry trends is a major feat, and the average businessman faces an overwhelming task when selecting a word processing program for his microcomputer. The task involves three concerns: how to shop, where to buy and what to buy.

Three of the most popular methods on how to shop are summarized below. Whichever method you use, take a very serious inventory of your word processing needs and determine what type of work you expect your word processing program to do. If you don't know, ask the person who does your typing.

The first method involves visiting local dealers and requesting a demonstration. This may be the most effective method of shopping, since it allows firsthand observation. The trick is to find a knowledgeable and objective salesman who can demonstratate the right

By Susan Harmon

products. Bring along a list or a sample of the types of documents you produce. And do not hesitate to take your secretary or whoever will be using the software along with you.

The second method is to read magazine articles. Reviews of the latest (and not so latest) word processors abound in every computer publication. This is an excellent way to pick up information, since the authors are actual users of the product.

An ancient, tried and true method is word of mouth. This is often more effective than advertising. However, when considering a recommendation, consider the source. Are your word processing activities similar?

If the majority of your work centers around producing long documents with constant revisions, some of the features you may want include:

- Automatic pagination, which causes page breaks to occur after the appropriate amount of text has been entered.
- Disk buffering, which allows you to edit a document larger than the size of your memory.
- Dynamic screen editing, which offers easy and responsive editing techniques.
- Automatic footnote placement and numbering.
- Print spooling, which permits simultaneous printing and editing (background printing).
- Print queuing, which allows you to send several documents to the printer at once.

There are several products on the market that handle long documents well. The best page break handler on the market is Micropro International Corp.'s Wordstar. Although most word processing packages offer automatic pagination, Wordstar shows page breaks dynamically on the screen while you are editing. The page breaks will reflect line spacing, top and bottom margins, headers and footers, as well as the paper length. For example, if you change the line spacing, Wordstar will automatically determine the new number of lines per page.

You can, of course, force your own page breaks as well as set up conditional paging to protect charts and tables from being broken up. Wordstar allows print spooling, but not print queuing. Another dynamic page breaker is Satellite Software International's Wordperfect. Wordstar has a bit of an edge since it reflects unusual line spacing more accurately and displays which page breaks are natural and which are forced. However, Wordperfect offers great print queuing and, in fact, comes closest to emulating the shared logic systems of dedicated word processors in that regard.

Wordperfect features a system commands menu that allows total control over the printer type, the printer status and the various print jobs without leaving the current document. Wordstar has always been considered one of the slickest editors around; it can now share that distinction with Wordperfect 2.3. Wordperfect is quick and responsive. Unlike Wordstar, the text automatically adjusts as you move through it. Wordperfect also allows a vast amount of cursor movements; the user can determine precisely how many characters or lines the cursor will jump in any direction. Both Wordstar and Wordperfect also display double and triple spacing on the screen.

Wordstar offers automatic hyphenation decisions during paragraph adjust, and Wordperfect offers hyphenation decisions as you are typing. Wordperfect has one unique advantage in that it stores and remembers all format settings and changes with each document, including margins and tabs, double-spacing, indents and so on. There is no need to reset them with each editing session. This function's major drawback is that the user must find and delete a setting before changing it, which can be tricky for a beginner. Both Wordstar and Wordperfect sell for $495.

If you need to work with several documents at one time, take a look at The Final Word, from Mark of the Unicorn, Inc., or Perfect Writer, from Perfect Software, Inc. The Final Word has a feature called 12-12! — text buffers that can hold other documents or other programs to be called in at will. Its State Save feature allows you to return to your original document as you left it. The Final Word also has complete crash recovery in case of a temporary computer failure, which is a lifesaver when you are editing a large document.

Perfect Writer has seven text buffers plus two screen windows that allow you to view and edit two documents simultaneously.

The Final Word does not display page breaks, and Perfect Writer does this only on the IBM Personal Computer version. They both, however, allow you to view the text before printing to check for accurate page breaks. The Final Word costs $300, and Perfect Writer costs $495.

Other products that offer multi-window displays are Visicorp's Visiword, Select Information Systems, Inc.'s Select and Emerging Technology Consulting, Inc.'s Edix/Wordix. Visiword costs $375, Select costs $$495 and Edix/Wordix costs $390. With the exception of Wordstar, all of the products mentioned above allow you to produce multiline headers and footers.

The ability to move blocks of text is essential when editing long documents. Just about every word processor offers this feature, but the approach varies with the product.

Footnotes can be automatically generated using The Final Word, Perfect Writer, Wordperfect, Edix/Wordix and Benchmark from Metasoft Corp. Benchmark also offers automatic page break display, multiline headers and footers, conditional paging, widow and orphan protection, print spooling and print queuing. However, because of the necessity to switch to a command mode for cursor movement as well as editing, it is not as dynamic as Wordstar or Wordperfect. Benchmark sells for $495.

Although Benchmark displays page breaks dynamically, it also offers a view mode, called formatting to the screen, during which temporary changes can be made before printing the file. These changes will not affect the stored document. Like Wordperfect, Benchmark stores format settings although it does this through the use of panels or format screens that are not user-accessible through the text, as they are in Wordperfect.

Another handy tool while editing lengthy text is the ability to put place markers in a file. Wordstar permits 10 place markers, easily accessed at any time. In fact, even without them, Wordstar will return the cursor to its position prior to the last issued command, such as search and replace. Multimate, from Softword Systems, Inc. is the only product I know of that actually allows you to store place markers with your document. Multimate costs $495.

The ability to move blocks of text is essential when editing long documents. Just about every word processor offers this feature, although the approach varies with the product. Most products allow you to store the text in a temporary buffer until you decide what to do with it. Lexisoft, Inc.'s Spellbinder allows you to add more text to the buffer, instead of writing over what is already there. It sells for $495. Wordstar dynamically highlights the marked portion of text; you can easily fiddle around with the size, and it remembers the last marked block.

Some of the others cause you to delete temporarily the text you are moving or copying, while putting it into the buffer. This makes me nervous. Suffice it to say, moving text, like search and replace, has become a standard feature.

Search and replace is another important feature for long documents. It has also become common in word processors today. Edix/Wordix will allow you to use wild card characters such as "*" and "?" to indicate a certain pattern for search and replacement strings. You can instruct it to look only at the beginning or the end of the line.

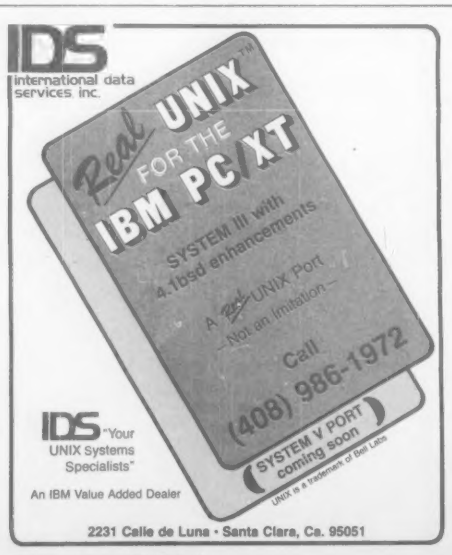
You can then request a pause for confirmation before replacements are made. After accepting the first few substitutions, you can change your mind and tell it to continue with all replacements without pause. However, I contend that Wordstar has the most full-featured search and replace. Wordstar searches forward and backward, as do Wordperfect and Perfect Writer, and will optionally search for uppercase and/or lowercase, whole words only, hard carriage returns or a specified number of occurrences.

Wild cards will match any character, any symbol or any character other than ". . ." — for example, off limit characters. It will replace globally or selectively and will search and delete. The other word processors offer some of these functions, but not all. However, that is quite a list, and Wordstar may offer more than the average user cares about.

If you often prepare repetitive documents such as legal contracts or insurance forms, take note of Benchmark, Perfect Writer and Multimate. They each allow you to assemble a document automatically from a library file of standard paragraphs. Multimate was conceived from the Wang Laboratorties, Inc. word processor and is similar to it in design and execution.

Because Multimate is a page-oriented word processor with a physical page limit of 150 lines, it does not feature dynamic pagination like Wordstar, Wordperfect, Perfect Writer or Benchmark. However, it does have an automatic as well as a manual pagination to give the user full control over the page breaks. Multimate also features disk buffering, multiline headers and footers, orphan and widow control, print spooling and print queuing. It does not offer automatic footnotes or conditional paging.

Wordstar shows justification or ragged right on screen, but it displays printer controls for special effects such as boldface and underline. Although you can suppress these controls, what you see is not exactly what you get. The same is true for Perfect Writer. Wordperfect displays bold and underscore, but does not



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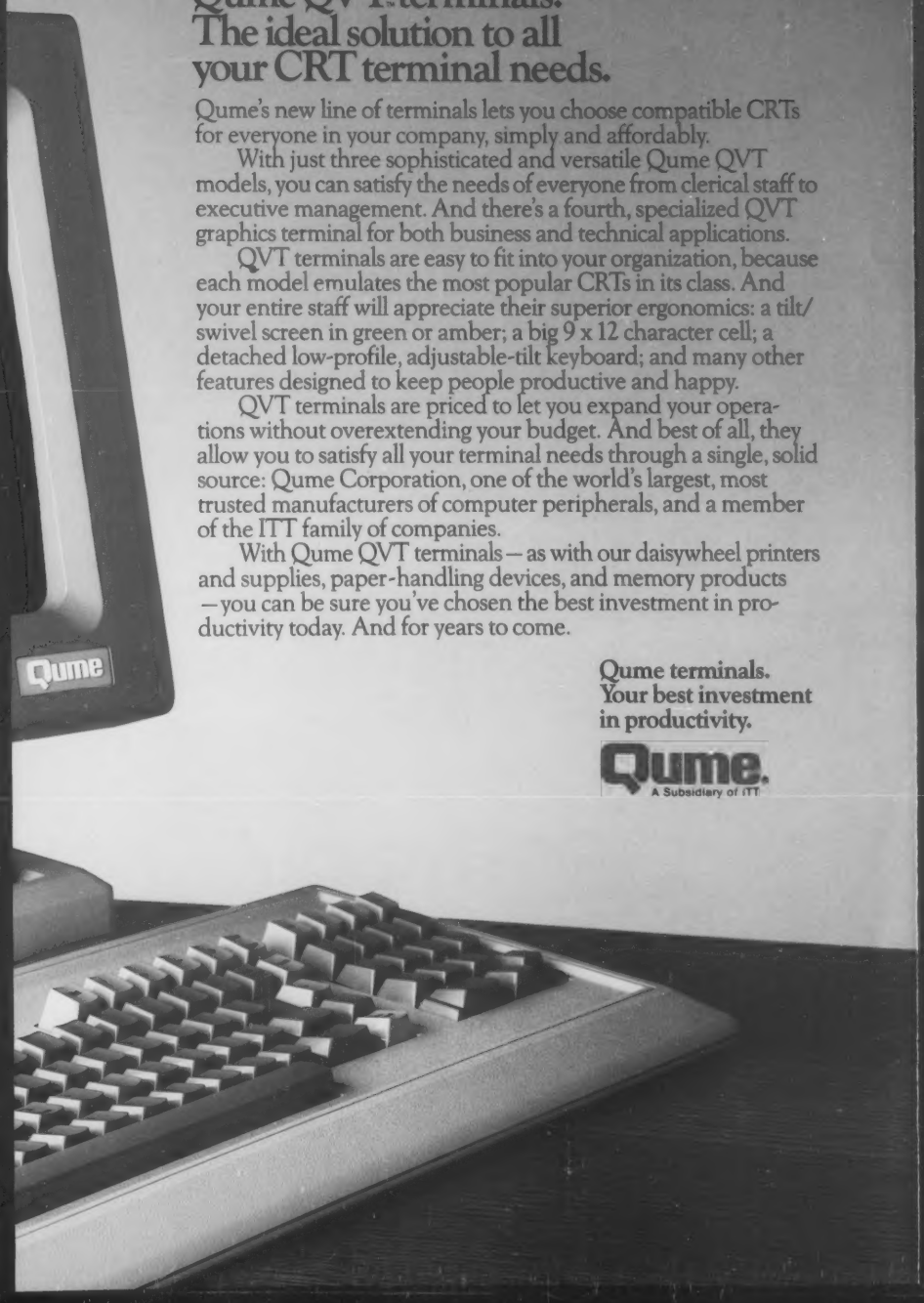

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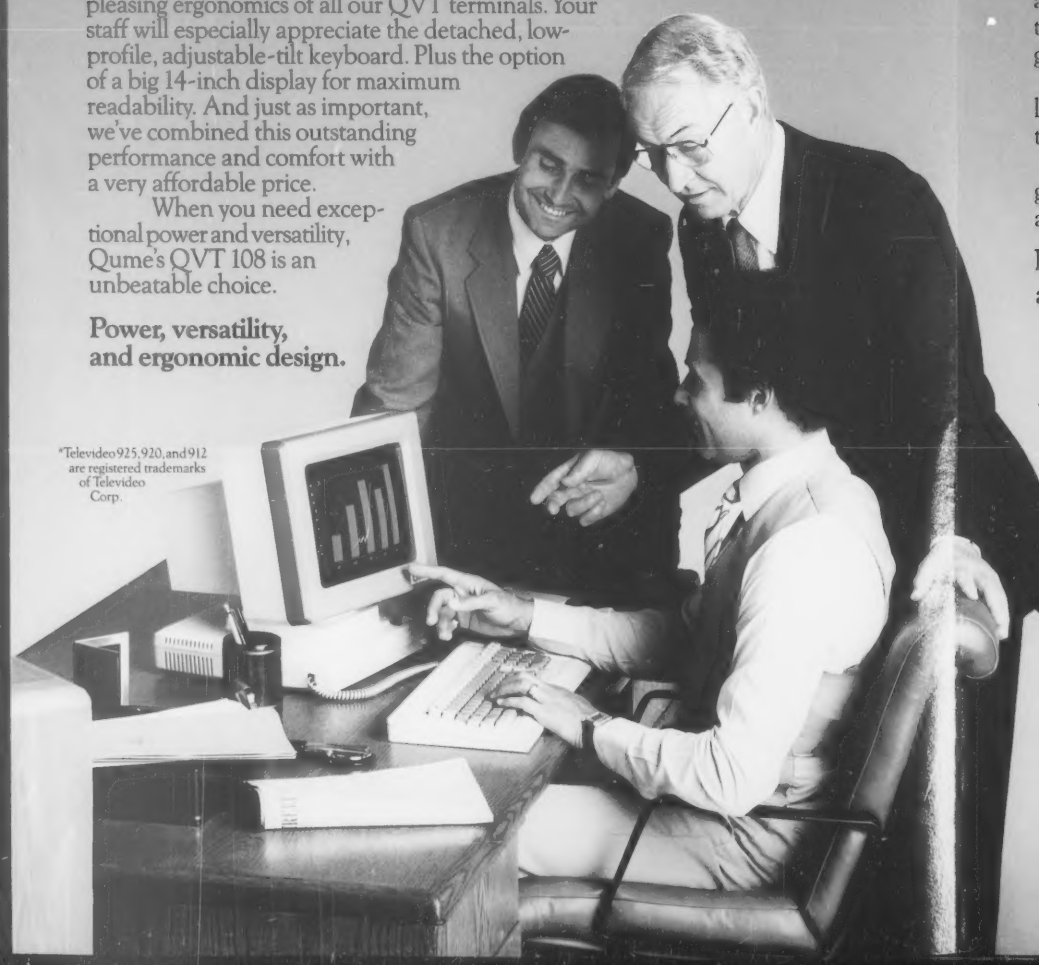

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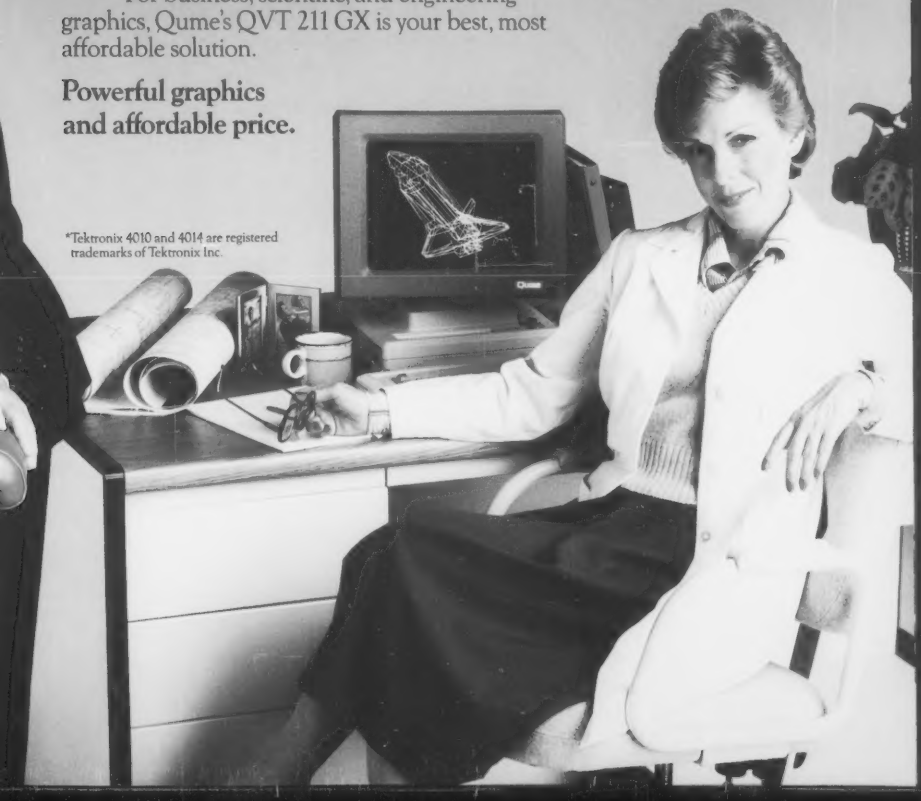
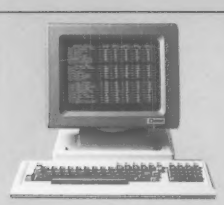


	Applications	Features and Emulations
	Data entry; order entry; data inquiry and updating; information retrieval; electronic mail; clerical word processing **QVT 102™**	Block and conversational modes • local editing • 12 preprogrammed functions • line-drawing character set • 25th status/set-up line Emulates Hazeltine 1500, Lear Siegler ADM 3A/5, and Televideo 910
	Data analysis and testing; data entry/information retrieval; modeling and simulation; financial and statistical analysis; systems operation monitoring **QVT 103™**	14-inch screen • block and conversational modes • 14 editing keys • 8 user-programmable functions • 2 pages of screen memory (expandable to 4) • 80/132-column format • 10 x 12 character matrix • 25th status/set-up line • bidirectional auxiliary port Emulates Digital Equipment Corp.'s VT 52, VT 100, and VT 131
	Transaction processing; report preparation; creation of business forms; access control; labor costing; scheduling; inventory control; word processing; accounting and general ledger functions; econometrics **QVT 108™**	Block and conversational modes • local editing • 22 user-programmable functions • 2 pages of screen memory • line-drawing character set • 25th status/set-up line • bidirectional auxiliary port Emulates Televideo's 925, 920, and 912
	Business planning and graphics; interactive presentation graphics; mapping; image processing; process display; graphic arts; spatial data analysis; broadcast and overlay graphics; simulation; computer-aided design; plus all applications of the QVT 102 **QVT 211 GX™**	Full interactive vector graphics • draws lines, boxes, arcs, and circles • variable gain and relocatable origin • 14-inch screen • switchable video • absolute and relative addressing • separate display memory for graphics • plus all QVT 102 features Emulates Tektronix 4010 and 4014

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display justification. Perhaps Easywriter II from IUS Ltd. comes the closest to showing exactly what will be printed, since it shows special effects as well as justification. However, since it is a page-oriented system, you can only see one page at a time. I like to see everything on the screen while I am editing, including dynamic formatting as well as the ruler line, which is why I like Wordstar and put up with the printer control characters. Easywriter II costs $300.

However, I concede on the issue of specialized format requirements. Computers have not come that far yet. If you produce specially formatted documents, neither Wordstar, Wordperfect, Benchmark nor Multimate will suit you in the long run. If you produce documents with outlines, tables of contents, indexes, multiple columns and so on, you look for the format specialists.

The concept of style sheets or specially prepared format designs is becoming extremely popular, and several word processors specialize in this feature. A fine example is Powertext from Beaman Porter, Inc., which lists for $399. The product comes with several preset format sheets that you can use or alter. You can also prepare your own. You simply indicate exactly where you want the text to appear on the page by answering a few simple questions. The concept is that of a steno pad. You input who the letter is to, who it is from and what you want to say: first paragraph, second paragraph and so on. Before you actually type the text, you indicate what it is — for example, the addressee, the closing and so on. Powertext formats according to your specifications, and it prints correctly formatted.

Although Powertext does not offer print spooling, print queuing or dynamic editing display, it is a powerful formatter. It will create a table of contents, multiple columns and even text in a box for special reports. As a user, I found the command menus a bit confusing and the fact that word-wrap must be turned on manually a bit disconcerting, but Powertext's unique formatting capabilities far outweigh its disadvantages. Additionally, it provides a less powerful mode that will allow you to create dynamically displayed text.

Emerging Technology's Edix/Wordix is a similar product that actually separates the editor and print formatter into two different programs. But it provides a huge amount of power. Edix/Wordix offers multiline headers and footers, labeled and automatically numbered lists, section numbering and table of contents, page and section numbers in headers or footers and automatic footnoting, as well as forms design.

Like The Final Word, Edix/Wordix provides 12 text buffers and will display up to four windows. Edix/Wordix offers up to 18 Help displays to assist in extravagant formatting. Powertext and Edix/Wordix specialize in special formatting. They are not, however, alone in this field.

Both The Final Word and Perfect Writer offer outline formatting, table of contents and indexing. Perfect Writer features an advanced set of prestructured formatting commands. This set allows you to number automatically, center many lines at once, produce a quotation environment and produce any specialized format in the middle of a standard document, which can be viewed before printing. The possibilities are limitless. Preprinted forms can be handled by Benchmark, Wordix/Edix and Wordplus-PC from Professional Software, Inc. Wordplus-PC sells for $395.

There are a number of word processing packages available which, although weak in the editing department, have some very unique printer capabilities. Peachtree Software, Inc.'s Peachtext (formerly Magic Wand) is a fine example of a product that can perform magic on the printer. Using its conditional printing capabilities, it can be used to mass-produce campaign letters to contributors based on the size of the financial endowment. The letters vary with the amount of generosity. Peachtext costs $395.

Sorcim Corp.'s Superwriter is another example. It can use its capability of reading variables and performing conditional printing to do a similar function.

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Superwriter is, as mentioned above, weak in the editing area. Although the basic editing is dynamic, all of the formatting is done through special coding, again offering a view mode before printing. Superwriter lists for $295.

Word processing on micros is more and more beginning to resemble the dedicated word processors. This is partly because many packages are being written for specific computers such as the IBM Personal Computer and the Digital Equipment Corp. Rainbow with their many function key possibilities. More importantly, power is being added in the form of more advanced features. Wordperfect offers math and multicolumn formatting. Benchmark also offers math and, along with WordPlus-PC, handles business graphics. Spellbinder offers math, multicolumn formatting, a sort feature and more.

Another feature borrowed from dedicated word processors is the concept of the document history or comment sheet, which can include information on author, typist, subject matter, revision dates and so forth. Superwriter, Benchmark, Peachtext, Visiword and Multimate are among those that offer this feature. In fact, Multimate features key word indexing of documents through the document history sheet.

Wordstar set a precedent by introducing the marketing concept of modular program design. Instead of including some of these advanced features in Wordstar, Micropro offers them in separate products. Mailmerge performs file and mail list merging; Spellstar checks spelling; and Star Index generates outlines, tables of contents and indexes.

Wordperfect includes a merge function. A special sort program and a spelling checker are offered separately. Spellbinder has a merge but not a spelling program. Peachtext includes a merge function as well as a limited math function, and spelling is extra. Edix/Wordix also offers merge capabilities, but spelling is extra. Multimate offers merge and will soon include spelling.

There are separate spelling and merge packages for Benchmark, Perfect Writer, Visiword and Easywriter II. Both Select and Superwriter include a speller and a merge program. Currently, The Final Word does not offer either capability.

Macros are in. They have always been around, but now they are regarded as sexy, and they are becoming more popular and more user-friendly. Macros offer the ability to store a repetitive sequence of commands or keystrokes under one key. It is almost like programming your own function key. For example, Benchmark requires the user to access panels to alter page formats, print styles and tab lines requiring a series of keystrokes. You can avoid these panels by assigning the often-used keystrokes to one key.

Macros are also offered by Multimate, Edix/Wordix, Wordperfect and Spellbinder. In fact, Spellbinder uses its own predefined macros to give you mail merge, sort, column printing and calculator functions. Spellbinder also includes M-speak, its own programming language. Macros can save laborious keystroking, and, when set up in advance, they can facilitate the use of the software by relative novices.

Before running out and buying any of the above packages, consider this question: Who is going to be using the product? All of these are fine products, but many of them have a defined user group. For instance, The Final Word and Spellbinder are not suitable for the average secretary, partly because neither product has any secretary-oriented training guides or tutorials. Their level of sophistication is aimed toward a more experienced user. The Final Word has defined its market as professional or technical writers.

Lexisoft is totally rewriting Spellbinder's documentation and also making its macros easier to use. This should widen its potential user market considerably. For the last several years, the product best known for its friendliness and ease of learning has been Select. Its famous Teach facility, which is included with the product, brought computerized word processing to offices that have a problem of high turnover and need a very low learning curve.

Once a simple program, Select has improved increasingly over the years. Today, Select features on-screen displays for bold, underline, justification, two viewing windows, document assembly and more. Version 3.0, soon to be released for all formats, will include keystroke memory, saving tabs, decimal tabbing and printer interrupt to change font styles.

With the advent of the personal computer, a new user group is emerging — the executive or management professional. If every other white-collar professional will have a computer on his desk in ten years, it is obvious that computers will be used by more than just typists. For executive word processing, you need a program that is easy to learn and use. Power is not as important.

My vote goes to Volkswriter from Lifetree Software, Inc. Without a doubt, it is the easiest word processor to learn. I was able to understand 75% of it within 20 minutes without the manual. It is not disk-buffered, and it does not display dynamic page breaks, although it does have a view mode. In addition, it does not display bold or underscore. It does have a file-include statement to insert other files while printing, and it has an international version that supports special foreign characters.

However, avid fans of Volkswriter who feel they have sacrificed power for ease of use should take heart. Lifetree is releasing its deluxe version, which will include horizontal scrolling, text merge, dynamic page breaks, disk buffering, footnote generation and printer configuration for the user. It will support five different fonts. Volkswriter costs $195.

Visiword is another executive word processor. It is completely menu-driven and easy to learn. Visiword features windows, horizontal scrolling, on-screen justification, table of contents generation and a complete on-screen tutorial. Perfect Writer and Wordperfect also include

	Word-Star 3.3	Word-Perfect 2.3	Volks-Writer	Final Word	Select 3.0	Microsoft Word 1.0	Wordplus-PC	Super-Writer
Memory	64K	128K	64K	64K	64K or 128K	128K	128K	64K
Operating System	CP/M-80, CP/M-86, PC-DOS	PC-DOS	PC-DOS	PC-DOS, CP/M MS-DOS, Venix	CP/M-80, CP/M-86 PC-DOS, MS-DOS	PC-DOS, MS-DOS	PC-DOS	CP/M-80, CP/M-86, PC-DOS
List Price	$495	$495	$195	$300	$495	$375	$395	$295
Automatic Hyphen	Yes	Yes	No	No	No	Yes	No	No
Column Move	Yes	Yes	No	No	No	Yes	Yes	No
Horizontal Scroll	Yes (256)	Yes (158)	No	No	No	Yes (256)	No	No
Automatic Indent	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Decimal Tab	Yes	Yes	No	No	Yes	Yes	Yes	No
Bold, Underline Display	No	Yes	No	One or the other	Yes	Yes	Yes	View only
Justification Display	Yes	Yes	View only	Yes	Yes	Yes	No	View only
Double Spacing Display	Yes	Yes	View only	No	No	Yes	No	View only
Page Break Display	Yes	Yes	View only	No	Yes	Yes	No	View only
Window Display	No	No	No	2	2 — View only	8	No	No
Outline Format	No	No	No	Yes	No	No	No	No
Conditional Paging	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Automatic Footnotes	No	Yes	No	No	No	Yes	No	No
Copy Files	Yes	No	No	Yes	Yes	Yes	No	No
Disk Buffering	Yes	Yes	No	Yes	Yes	Yes	No	No
Automatic Backup	Yes	No	No	Yes	Yes	Yes	No	Yes
Print Spooling	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Print Queuing	No	Yes	No	No	No	Yes	No	No
Proportional Printing	No	No	Yes	Yes	No	Yes	Yes	Yes
Column Print	No	Yes	No	No	No	Yes	No	No
Document Assembly	No	No	Limited	Yes	Yes	Yes	No	No
Table of Contents	Extra	No	No	Yes	No	No	No	No
Math	No	Yes	No	No	No	No	No	No
Merge	Extra	Yes	No	No	Yes	No	Yes	Yes
Spelling	Extra	Extra	No	No	Yes	No	No	Yes
Training Guide	Yes	No	No	No	Yes	Yes	No	Yes

on-screen tutorials. For all of its power, Wordperfect can be tricky, but is made easier to learn by the fact that all commands are accessed by the function keys on the IBM Personal Computer and a command template is included. Additionally, a smaller, easier version called Personal Wordperfect is available. It is missing many of the advanced features, but not the basic power, and the price is greatly reduced from $449 to $195.

Products like Visiword, Multimate, Wordplus-PC, Wordperfect and Easywriter II were written specifically for the IBM Personal Computer and therefore utilize the function keys fully, which is a real aid to learning commands.

The version of Benchmark on the DEC Rainbow also takes full advantage of the function keys. However, the learning curve is a bit higher for products like Wordstar, Spellbinder, Peachtext, Superwriter and The Final Word. These products have crossed over from CP/M versions that had to operate on a wide variety of keyboards and are highly dependent on control/key command sequences and format coding from the keyboard. Whichever word processor you choose, investigate the kind of training assistance offered with it.

Although not yet in the top 20, there are two products that demand honorable mention in any general overview. Microsoft, Inc.'s new product Microsoft Word lays claim to all of the features discussed above and more. It has not been released yet, but it promises to include eight editing windows, multiple font selection, print spooling, print queuing, displayable super and subscripts as well as italics, horizontal scrolling, proportional spacing, footnotes, automatic paragraph adjust and a two-course training guide as well as on-screen tutorials and Help screens.

That is just half of its intended capabilities. You can store from one character to 10M bytes in a glossary under a one-character reference name. Then, by either typing the names or selecting from the glossary directory, you can assemble a lengthy document using this boilerplate material.

Microsoft Word also offers dynamic condensed capitalization, which allows you to reduce in size logos or trademark systems for superscripting. Although the initial release will not include a merge or a spelling program, both, along with other advanced features, are planned for a future release. Whether or not future versions will be modular in concept has not been made public. Microsoft Word lists for $375.

Microsoft is capitalizing on the new mouse technology by offering the optional purchase of a mouse along with the product. The difference is $100 in price, but there is none in functionality. Executives may find that the mouse facilitates their operation of the software. Certainly, less keyboarding is involved. The command structure will be the same as Multiplan — an easy transition to make for current users.

This may give the old veteran Wordstar a true run for its money. But Micropro will also soon release Wordstar/Mailmerge 4.0, which will include all features available today in any word processor and more. It will be an interesting confrontation.

Techwriter, written by Computer-Mart, Inc., has been around for about a year on Northstar Computer, Inc.'s micro, the Northstar Advantage. It will soon be released on CP/M-80 for the IBM and the Apple micros. Techwriter is a scientific word processor that does amazing things. It performs all of the ordinary functions, including the fastest search and replace I have ever seen.

Techwriter also generates tables of contents, indexes, multiple columns and includes a merge function. The clincher is that it displays super and subscripts and Greek symbols on screen with the touch of one key. It also features an equation mode as well as access to a glossary containing symbols such as radical signs and sigmas. It displays equations as they will print.

The glossary function also features a quick and easy way to produce a letter with its envelope and design-your-page numbering format. With the exception of the formatting commands, all of the functions are accessed through the many function keys of the Northstar Advantage. The same will be true for both the Apple and IBM versions.

Techwriter comes with the most complete reference manual I have ever seen, and a training guide for all versions will be available soon. Additionally, numerous Help screens assist the user in learning the product. Techwriter is currently being used in many major universities all over the country. If you produce highly specialized technical or scientific documents, Techwriter may be a wise choice. Its price is not available yet.

If you need to combine word processing with other functions such as mail list creation and spreadsheet generation, consider buying a family of products. Many companies, including Visicorp, Perfect Software, Micropro, Sorcim, Microsoft and IUS, market a family of compatible products.

Besides the obvious file compatibility advantage, products within the same family generally use similar command structuring. Micropro, Sorcim and Microsoft products all share many commands within the family. If you prefer a cross section of products, check to see if they offer file compatability with other products.

Make sure that your software is totally compatible with whatever printer you choose. If you do not see it on a list of installable printers, but still hear "No problem," run the other way. The Final Word and Perfect Writer win the printer compatibility award. They claim intimate knowledge of over 40 printers.

Many products rely on printer tables which, while giving many more options, can be a problem if you do not know what you are doing. In the long run, it pays to buy from a dealer that will install and support your printer.

Select a word processor the way you would choose a car — consider utility, design and price. Go for the features that give you the best functionality, and try to get the most for your money. ♦

Harmon is a consultant with Transitions, Burlington, Mass.

	Tech-Writer	Bench-Mark	Perfect-Writer	Easy-Writer	Multi-Mate	Power-Text	Spell-Binder	Peach-Text 5000	Edix/ Wordix	Visi-Word
Memory	64K	128K	64K or 128K	64K or 96K	128K	64K	64K	128K	128K	128K
Operating System	CP/M-80	CP/M-86, PC-DOS, MS-DOS	CP/M, PC-DOS	PC-DOS, MS-DOS	PC-DOS	P-System	PC-DOS, CP/M	PC-DOS	PC-DOS, MS-DOS	PC-DOS, MS-DOS
List Price	Not available	$495	$495	$350	$495	$399	$495	$395	$390	$375
Automatic Hyphen	Yes	Yes	No	No	No	No	Yes	No	Yes	No
Column Move	Yes	Yes	No	No	Yes	No	No	No	No	Yes
Horizontal Scroll	Yes (127)	Yes (155)	No	No	Yes (156)	No	Yes (159)	No	Yes (256)	Yes (128)
Automatic Indent	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Decimal Tab	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Bold, Underline Display	Yes	No	No	Yes	No	No	No	No	No	Yes
Justification Display	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes
Double Spacing Display	No	No	No	No	No	No	No	No	No	Yes
Page Break Display	Yes	Yes	Yes — IBM	No	No	No	No	No	No	Yes
Window Display	No	No	2	No	No	No	No	No	4	2
Outline Format	Yes	No	Yes	No	No	Yes	Yes	No	Yes	No
Conditional Paging	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	No
Automatic Footnotes	Yes	Yes	Yes	No	No	Yes	No	No	Yes	No
Copy Files	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Disk Buffering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Automatic Backup	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes
Print Spooling	Yes	Yes	Yes	Yes (96K)	Yes	No	Yes	Yes	No	Yes
Print Queuing	Yes	Yes	Yes	Yes (96K)	Yes	No	Yes	No	No	Yes
Proportional Printer	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No
Column Print	Yes	No	No	No	No	Yes	Yes	No	No	No
Document Assembly	No	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No
Table of Contents	Yes	No	Yes	No	No	Yes	No	No	Yes	Yes
Math	No	Yes	No	No	No	No	Yes	Yes	Yes	No
Merge	Yes	Extra	Extra	Extra	Yes	Yes	Yes	Yes	Yes	Extra
Spelling	No	Extra	Extra	Extra	No	No	No	Yes	Extra	Extra
Training Guide	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes

E·X·T·R·A·!

THE POLITICS OF IMPLEMENTATION

ILLUSTRATION BY RICH TENNANT

The widespread use of microcomputers, or personal computers, is creating a political schism between the more traditional data processing personnel, DPers with microcomputer expertise and nontechnically oriented micro users. Sometimes this results in the development of separate competing functions within an organization.

Several factors must be considered in order to comprehend and avoid office politics and counterproductive professional antagonism. Most of the office politics surrounding the introduction of microcomputers is due to a combination of factors: administrative considerations, zealous vendor marketing, the relative merits of using large

By Don L. Eddy and Connie L. Gordon

MICRO MISSION

mini and mainframe systems vs. microcomputers for data processing functions and perceived instrusions on DP professionalism.

Over the past 10 years, rapid technical advances and reduced production costs have fostered and nurtured the microcomputer industry. Technological innovations have made the reduction of the size of computers possible to the point where sophisticated computers can now occupy a small fraction of the space formerly required, with large data storage and processing units requiring no more than microcomputer space.

Since the introduction of microcomputers, innumerable companies specializing in their production have sprung up, and many have also disappeared. Leading computer manufacturers such as Burroughs Corp., Digital Equipment Corp., Honeywell, Inc. and IBM have developed microcomputers to claim a share of the market. Specialized off-the-shelf software packages have been developed to run on various microcomputers.

Technical journals, specialized magazines and product-oriented users groups have sprung forth to share information and to meet the ever-increasing needs of both DP professionals and hobbyists. Despite all of these resources, a serious void exists. To date, there are no magazines or journals specifically oriented toward the non-data processing business professional.

Misunderstandings among users have arisen concerning the capabilities and benefits of microcomputers. In many respects, these misunderstandings parallel those that accompanied the introduction of the initial computer systems in the late '50s and early '60s. These same misunderstandings are leading to problems similar to those experienced during that period.

Vendors have and continue to market their microcomputers as a panacea that will, with the use of prepackaged software packages, make many clerical and managerial tasks more efficient and less expensive — in terms of developmental costs of software and in minimizing turnaround time and production costs. In addition, when a manager's microcomputer is idle, an administrative assistant may use it as a word processor.

With nontechnically oriented users given data processing capabilities, their dependence on a centralized data processing operation to develop and produce specially designed business graphs and spreadsheets is minimized or eliminated. Now, project management reports and data base management-like software packages, as well as word processing capabilities, are available to the non-data processing user. Of equal importance, stand-alone microcomputers can be fully under the user's control.

In view of what is publicized as a relatively modest investment, these claims are quite appealing to the business community. Although the cost of the first one (approximately $4,500) appears low, it is the cost of the other 100 to 200 units ($450,000 to $900,000) that is the bottom line. These microcomputers can be so productive that everyone in an organization believes that they deserve one. The problem, then, is one of control via corporate policy.

As with larger computers, there is a lack of industry wide standards for microcomputers. These differences cause a multitude of technical misunderstandings that can only be resolved with the intervention of knowledgeable microcomputer experts.

For example, not all microcomputers use the same operating systems: Programs developed to run on one operating system will not function on another. Not all microcomputers use the same or even similar versions of programming languages, rendering many programs inoperable on different units. Processing and storage capabilities vary between microcomputers, depending on the amount of memory — both in terms of read-only memory and random-access memory — in each respective unit. Electromagnetic storage media — for example, cassette tapes, 3-in. 5¼-in. and 8-in. floppy diskettes and hard disks — are usually mutually exclusive and may not be used interchangeably on a microcomputer. Furthermore, information usually is not readily transferable from one storage media to another.

Businesses that currently have large computers usually want to network microcomputers with other microcomputers and with their large computers or minicomputers. This presents another set of technical problems. In larger data processing systems, communications procedures vary. The same is true between microcomputers. Therefore, interfacing or networking microcomputers with one another or with minicomputers or large computers requires the skills of data communications experts.

Aside from the technical problems associated with networking computer hardware, administrative management, file management and file security are rather complex problems. Files on minicomputers and large computers reside in one location — on magnetic tape or on disk. Data processing personnel are responsible for regularly creating backup copies of data files. Access to viewing, copying, modifying and deleting data files on larger computers is usually controlled by a security system.

In contrast, files on microcomputer are highly portable. Regardless of

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THE SOFTWARE ENGINEERS

the storage media used — for example, cassette, floppy diskette or even portable hard disk — the location of the files is determined by the user. They are not in one central location. Thus, it is imperative that procedures be carefully established to inventory and control microcomputer files. Together with provisions for system, storage media and file structure compatibility, the establishment of reasonable controls and procedures can result in the prevention of redundancy of effort and the creation of shared information resources for greater office productivity.

Care must also be taken to copy these files routinely and protect them from environmental damage — for example, damage from heat, humidity, dust, electromagnetic erasure and damage due to handling.

In-house squabbles over microcomputers cover a multitude of topics and professional and political concerns. For example, who should be involved in deciding to purchase microcomputers — upper or middle level management, end users, data processing personnel or a combination? Who should carry out equipment and prepackaged software evaluations, recommendations and selection? Should there be a formal or informal program established to introduce microcomputers and train the end users in their use? If so, who should conduct the training — data processing personnel or the administrative staff? Who should be responsible for the maintenance of the microcomputer and software acquired? If software programs require interfacing, who will be responsible for the development of the required software — the end users or data processing personnel?

In-house squabbles over microcomputers cover a multitude of topics and concerns. For example, who should be involved in deciding to purchase microcomputers?

Aside from a dichotomy being drawn between DP personnel and microcomputer users, there is a distinction between traditional data processing personnel and those with microcomputer knowledge. Some of the more traditional DP professionals tend to downplay the importance of using and integrating microcomputers in a multifaceted computer configuration. Some may realize that it presents an important breakthrough in technology, but think they are old to learn about it. Others totally ignore microcomputers, considering them to be a passing fad.

Microcomputers acquired as part of a formal business information systems plan have higher rates of acceptance, use and productivity. They are researched and purchased in an orderly manner and are used as stand-alone processing units, in a network of microcomputers or integrated into a larger data processing system. All stages of acquisition use and projected use of microcomputers are carefully defined by the user. Future usage is projected, and there is a clear statement of the involvement and extent of responsibility of all personnel associated with the various stages of this process.

Should there be a program established to introduce microcomputers and train the end users in their use?

In brief, a formal business information system plan clearly states the intended use of the microcomputers, the goals and objectives of using them, alternate methods of reaching the stated objectives, as well as the business issues and impacts involved in acquiring the desktop systems — in terms of the anticipated office productivity improvement opportunities, the problems and their potential solutions.

A logical structured approach toward obtaining and using microcomputers is always preferable. However, it

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may only minimize, not eliminate office politics surrounding microcomputers.

In most instances, microcomputers are acquired more casually. Occasionally, microcomputers are desired as high-technology status symbols to adorn someone's desk. More often though, executives, managers and support staff request and purchase microcomputers to perform specific processing functions. Aside from preliminary probing questions about the relative merits of various highly advertised microcomputers, data processing personnel are not consulted before the units are purchased by individual users. Conversely, when data processing personnel purchase microcomputers for users, they tend to do so without adequately determining true user requirements.

With these acquisition approaches, the buyer tends to have little or no knowledge of the problems likely to be encountered. Office productivity improvements are almost expected to coincide with the insertion of the unit's electrical plug into a wall socket. The user usually views microcomputer technology as a solution to office productivity problems, rather than a tool to improve office productivity. The machine is viewed as an end in itself, rather than a means to an end. Consequently, companies are experiencing an increase in the computerization of the unnecessary, which is counterproductive.

To offset the perceived microcomputer threat, the reaction of some data processing personnel is to put user-friendly software in large computer systems. This usually results in near-term requirements to increase the size and cost of the larger computer system. Moreover, this action provides a false sense of security for data processing personnel and added income for the large computer vendor.

As processing functions are taken over by the user, the need for data processing to justify more fully all of the activities, responsibilities and practices associated with the larger system increases. Hence, microcomputers may threaten current practices and planned expansion of the larger computer system.

There are innumerable books, seminars and short courses offered by a variety of firms, educational institutions, professional associations and vendors to familiarize technical and nontechnical users with microcomputers and software packages. Currently, only a small percentage of data processing professionals have been involved with microcomputers in the business environment. Some data processing professionals are only recently becoming acquainted with microcomputers, and some are developing expertise.

Most microcomputers and software packages have been specifically designed to be user-friendly. Therefore, nontechnical personnel are having little difficulty working with them. Programming languages commonly used on microcomputers appear to be easy to learn and tend to lull the user into a false sense of expertise. These languages are actually somewhat difficult to use and master without a thorough knowledge of fundamental computer programming concepts and controls.

The aim of the user-friendly design effort is to make computer processing functions accessible to more users — which it has. At the same time, it has created untold numbers of seminars and self-trained microcomputer "experts". Most of these "experts" are merely conversant in microcomputer terminology, technology and software. Very few of them actually have in-depth understanding of computer systems and the controls and procedures needed to create, maintain and manage an efficient, productive computer operation.

Office politics occurs universally at every organizational level. It involves the garnering of power and the appropriate maneuvers to accomplish an individual's or group's objectives. Sometimes those involved lose objectivity and place personal interests over a well-moderated business perspective.

While the user is best suited to define his own processing needs, there are many technical questions and problems that those well-versed in micros are best equipped to address.

Other more basic fears lie beneath the more obvious questions of expertise in planning, selecting and using personal computers.

Large computer and minicomputer installations are expensive. Aside from the initial purchase and installation cost, they require a staff of data processing professionals to maintain, manage, program applications, disseminate information and assist users on an ongoing basis. In effect, the computer installation is a localized service, or in some cases a series of localized in-house services, providing for an organization's information processing needs.

The introduction of microcomputers is perceived to present several threats to personnel in more traditional data processing environments. With massive advertising and educational campaigns and the ever-increasing use of microcomputers in schools, homes and offices, a demystification process has occurred.

Now, the end user is no longer dependent on data processing to meet all of his processing needs. With users given the ability to meet their own immediate information needs, the backlog of data processing requests is removed. As a result, data processing experiences a loss of control over certain processing functions. As this process occurs, the need for data processing to train and educate the users increases.

Nontechnically oriented microcomputer experts may offer well-meaning but inaccurate or inappropriate advice on the management, responsibilities and functions of the central data processing divisions. In response, data processing professionals may downplay the beneficial aspects of microcomputers, insisting that all processing be accomplished on the larger system. This may also occur when data processing wants to expand or upgrade its facilities: Clearly, a reduction of processing requests undermines these plans. Alternatively, if snubbed in the planning, selection and management phases of acquisition, data processing personnel may choose not to provide direction and guidance for the microcomputers. They simply wait for problems that overwhelm the users to arise before taking over.

Another important factor in this political situation involves the language of data processing. Specialized terminology evolves with each discipline and is intimately associated with specialization and professionalism. Today, much of the esoteric jargon of the data processing profession has become common English usage. Now, many young children discuss the different functions of random-access memory and read-only memory and peeks and pokes, as well as the relative merits of various computer chips and of volatile and nonvolatile memory. Thus, the popularization of professional terminology is perceived as yet another intrusion into the realm of the data processing professional.

Office politics occurs universally at every organizational level. It generally involves the garnering of power and the appropriate maneuvers to accomplish an individual's or group's objectives. Sometimes those involved lose objectivity and place immediate personal and professional interests above a well-moderated business perspective.

Whether microcomputers are acquired in a well-planned, well-executed manner or not, animosities will arise over them, and political tensions will mount. In order to minimize these problems, microcomputers must be recognized for what they are — tools to achieve greater office productivity, not as ends in themselves.

Perhaps because microcomputers are modestly priced and affordable to a broad consumer base, the care taken in justifying, researching, planning, acquiring, introducing and maintaining larger systems is not taken with microcomputers.

The creation of a successful computer system, be it large or small, requires input from and the cooperation and expertise of numerous people with diverse backgrounds. Upper and middle level management, other users and data processing professionals should be involved in planning, acquiring and establishing microcomputer systems. The exact mix of those involved is situational and best determined by knowledgeable management within the framework of formal information business system planning. ♦

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BREAKING GROUND

A BILLION-DOLLAR COMPANY IMPLEMENTS AN INNOVATIVE PERSONAL COMPUTER POLICY.

Personal computing is so important that its implementation and proliferation cannot be left to chance. Individuals can now have powerful computing capability at their desks. At one time, computers were expensive, and people's time was less expensive. Today, computing power is cheap and getting cheaper. The economy of computing has swung dramatically, and this change requires a rethinking of how information resources are managed. It is wise for organizations to take advantage of the new economics and adapt to the personal computing trend.

Setting a personal computing policy is complex and has many implications. Here is a case history of how one company established its personal computing policy. It

By Walter Ulrich

MICRO MISSION

involves a billion-dollar company headquartered in a major industrial city. Corporate and divisional office staff exceed 1,000 employees in the headquarters city. The company has over 20,000 employees and sells products throughout the U.S.

The company saw that personal computing offered great opportunities to improve productivity and effectiveness and to save money. It also recognized that deploying personal computers was complex and not without significant risk. Inaction was seen as an invitation to chaos.

The company has a substantial investment in software, hardware and training in an IBM mainframe environment. The applications development backlog was consequential. Over a year ago, the company established an office automation task force to review and evaluate the implications of office automation. The task force was composed of executives and middle managers representing the operating divisions, administration, finance, purchasing, data processing and other staff functions.

The issue of personal computers was one of several topics on the task force agenda. One of the operating divisions had already purchased two microcomputers. One was in a division manager's office. The other was used for division planning. Within the division, one forward-looking manager and one technically oriented staff member were internal champions for the personal computer. They used the micro extensively themselves and trained interested co-workers in its use.

In this nonthreatening and supportive environment, microcomputer use grew steadily. By the time the task force began meeting, the micro was being carefully scheduled so that it could be used by the many people who needed it. Individuals within the division and throughout the headquarters were requesting their own micros and were asking for personal computer support.

At the outset, members of the task force made three critical observations about personal computing. First, personal computers and office automation should become part of the company culture in a conscious and planned way, rather than in a chaotic and disorganized way. . .

At the outset, members of the task force made three critical observations about personal computing. First, personal computers and office automation should become part of the company culture in a conscious and planned way, rather than in a chaotic and disorganized way. Second, there is enough information available to make sound decisions about the implementation of a personal computer policy. Third, the company had never implemented a personal computer policy before. There were important technical, cultural and business issues involved. Outside expertise was seen as invaluable in light of the considerable impact micros were expected to have.

The company selected a consulting firm to assist in the office automation and personal computer area. The key criteria for selecting a consulting firm were competence, breadth of experience, complete independence and professionalism. References were checked carefully.

The consulting firm was given reasonable opportunity for data collection and was named as advisor to the office automation task force on matters of microcomputer policy.

. . . Second, there is enough information available to make sound decisions about implementing a personal computer policy. Third, the company had never implemented a personal computer policy before.

The firm was assigned to advise the task force on its full range of alternatives, and the task force would make the policy recommendations to the corporate officers.

Thirteen issues that merited consideration for this particular company were identified. These issues included initiation, justification, product selection, compatibility, procurement, implementation, training, programming, maintenance, user support, monitoring, control and general education.

While each of the issues was important to this company, four issues required considerable attention and discussion. Each of these are discussed below.

Perhaps the most critical question in any company is who will be responsible for monitoring and implementing personal computing. In every company, there are four groups, each with an important role. These

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groups are the information systems department, communications, end users and office administration.

Personal computer evaluation, selection and implementation are complex technical undertakings. In general, the information systems department has the charter to understand and implement information technology.

While many personal computers are used on a stand-alone basis today, it is clear that they will need to communicate tomorrow. The communications will be to the corporate mainframe, to specialized minicomputers, to public data bases, to other personal computers and to a variety of other services. The ultimate success of micros depends on establishing an adequate communications infrastructure. The communications function can play an important role.

End users have been the personal computer pioneers in many companies. Personal computers are confusing to them in some ways, but end users see the need and understand the benefits. They are demanding personal computing. As pioneers, they have had direct control of their micros. Now that microcomputers are becoming accepted, it is no wonder that end users are reluctant to give up that control to a staff organization.

Office administration has been serving the needs of the office and clerical worker for a long time. Office services people understand the needs of the professional, administrator, secretary and clerk. They have been focusing on the individuals' requirements for decades and can claim insight of the culture into which microcomputers must be placed. Their job has been thankless at times, but they have learned how to be responsive on a personal level.

In the subject company, as in most corporations, the pros and cons of who would be responsible for personal computers were complex. The information systems department had genuine interest in micros. At the same time, information systems was implementing a major new system that was seen as essential to accomplishing overall corporate goals and objectives. The applications development backlog was already substantial. In addition, the information systems department had developed procedures for handling the big systems projects. Resources were already in short supply, and the information systems department was not oriented to serving individual users.

In this company, communications responsibilities were divided among different departments. Therefore, no communications department was positioned to play the leadership role for personal computers.

End users were the first users of micros. They did not want their use to be impeded or obstructed in any material way. At the same time, the users recognized that resources had to be made available to nurture and support personal computer users companywide. The user divisions were willing to share some control over personal computing if they were provided specialized support and greater assistance.

Corporate administration and other staff departments were the first in the company to identify the need for overall office automation planning. The administrative staff examined many of the personal computer alternatives and were early supporters of micros within the company. They had been a catalyst in the formation of the office automation task force and had exercised leadership in evaluating advanced office technologies.

End users have been the personal computer pioneers in many companies. Personal computers are confusing to them in some ways, but end users see the need and understand the benefits.

The issue of responsibility and control was ultimately resolved. Currently, the chief administrative manager is responsible for implementing microcomputer policy, setting micro standards and providing micro support to the end users. The information systems department provides the technical and advisory staff to support the end users. The division executives have the final authority for the implementation of micros within their division. These executives also have the ultimate responsibility for monitoring personal computer use.

This approach does not fit every company, but answers all the major concerns of this company. The decisions for control of personal computers fit the corporate culture and match the skills of the different individuals. The administrative executive ensures that micros address the needs of the individual office worker. The information systems department provides qualified technical employees.

Personal computer technical staff stay on the information systems staff to ensure that an adequate career path is available and to provide added technical guidance. While this kind of dual reporting would be a nightmare in some environments, it works well for this company.

The division managers are held

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accountable for their respective division's performance. It was agreed that their authority must be final with regard to micros within their divisions. In practice, division management will look to the personal computer support staff for guidance. Division management will not often overrule the support staff as long as the support staff has the proper business and service orientations.

Another major question that arose was whether to standardize on a single micro vendor, select a few standard products or open the door to any micro that best meets the needs of a particular application.

Selecting a single vendor had both advantages and disadvantages. A single vendor would greatly simplify training, concentrate support skills and offer purchasing leverage. The ability to tie the micro together in the future would be greatly simplified, and the problem of accessing the mainframe would only have to be solved a single time.

On the other hand, a personal computer that is good for one task may be unsuitable for others. As technology evolves, integration problems that look awesome today may soon become trivial. One vendor may not be able to address all the company's needs at a reasonable price.

The company's policy decisions with regard to standardization are similar to those made in some other companies. The approach has broad applicability. A small number of products are approved as standards. Products are then chosen from the approved list to meet specific applications needs. The technical staff reviews new products and recommends changes to the approved list when it is necessary to do so.

In the event a job cannot be accomplished practically from the approved list, there is a mechanism established to allow deviations from the list.

Purchasing is assigned the responsibility to procure the hardware and expedite its delivery. Purchasing is acquainted with the applicable technologies and is expert at negotiating the best terms.

The company had traditionally viewed every purchase with great care and deliberation. How much justification would be required and who would be responsible for putting the justification together?

The task force recommended that several personal computer requests by end users be approved on a commonsense basis without formal justification. The feeling was that more experience with personal computers in end-user departments was needed before the full benefits could be appreciated. After this experience, it would be easier to list the benefits and justify the micros.

The task force felt that it could not infringe on the divisions' authority to establish its own justification procedures after the initial personal computer placements were made. The end users would be responsible for making their own case to their own division management. The personal computer support staff would advise and assist the users, but it was the requester who was responsible for getting approval.

The consensus of the task force was that too-elaborate justification would be detrimental. Since each part of the company was represented on the task force, it is expected that micro requests will be encouraged and that the justification efforts required will not be disproportionate to the size of the investment.

The company decided to offer micro support through a corporate personal computing center. The primary objective of the personal computing center was to serve end users by:

- Helping evaluate micro solutions to end-user information problems.
- Providing personal computer training and simple support to the end users.
- Making personal computers available so that end users could test drive them.
- Monitoring micro developments.
- Offering a sympathetic ear and helpful hand to users with personal computer problems.

The personal computing center could be characterized as a personal computing store within the company. Users could get specific information or they could browse. A micro hot line was also implemented so that a frustrated user could telephone with a question while still sitting in front of his microcomputer. Finally, some services from the information center concept would be made available to help meet some of the end-user computing needs that were poorly suited to personal computers.

Today, the company has a personal computer policy in place. Microcomputer use is encouraged, and its benefits are expanding. It is expected that micros will ultimately be an integral part of the information/office architecture.

Today, the company has a personal computer policy in place. Microcomputer use is encouraged, and its benefits are expanding. Since the policy was established with an eye toward overall office automation objectives, it is expected that micros will ultimately be an integral part of the overall information/office architecture.

The key elements of this company's policy-making success can be summarized as follows:

- Establishing a high-level task force representing all the parts of the company and dominated by no single division.
- Seeking the assistance of experienced, professional and objective consultants.
- Understanding all the issues and exploring all the options before trying to make any decisions.
- Discussing the critical decisions openly and eliciting the views of all interested parties.
- Putting the policy and first-level procedures in writing, explicitly assigning specific authority and responsibility.
- Keeping a broad perspective and considering the implication of other information, communications and office technologies.

Microcomputers can and should be a powerful tool in your company. They are so important that they must be implemented in an intelligent and forward-looking way. The development of a corporate personal computer policy is essential. ♦

Ulrich is president of Walter E. Ulrich Consulting, Houston.

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You must have experience in Design Engineering to assume the project responsibility and/or key design position in our product development organization. A BSEE is required with a minimum of six years applicable design experience including microprocessor communication interfaces and peripheral controllers. Familiarity with LANS, Fiber Optics, Winchester Disks, VLSI design, 68000 and other microprocessors is desirable.

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You will be part of the software development team and should be familiar with 8088, Z80, M68000 microprocessors and IBM personal computer design and operations. Experience with 3270 communications environment, i.e. SDLC/SNA and all assemblers is necessary. A background in IBM Virtual Host environment is required. A BSEE or BS in Computer Science or equivalent is required.

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You will participate in the design and development of the raster scan color data and graphics displays utilizing high resolution CRTs. Working knowledge of horizontal and vertical deflection circuits, video amplifiers, and color CRTs, plus a BSEE, or equivalent is required.

Senior Continuation Engineer - Digital

You will provide digital and firmware design support to ITT Courier products. Additionally, you will determine causes of product problems in the factory and field, and work closely with other departments to create good, cost effective solutions. Candidate must have a BSEE plus 6 years experience in digital circuit design, software development with an emphasis on microprocessors/full systems support, and IBM computer interfaces. Experience with system interconnect schemes, I/O devices, EMI suppression, and PCB layout is also necessary. Candidate must have knowledge of LSI, MSI, VLSI components, and microprocessor theory. Familiarity with IBM channel protocol is desirable.

Senior Electronics Device Engineers

You will support the design development and application packaging of state-of-the-art multiplexing circuits for a variety of display applications. Responsibilities will include providing technical support for LSI circuits, application packaging and technical liaison/coordination with other company development groups. Additionally, you will interface with IC process vendors, define chip partitioning, architecture, test programs and evaluate processed IC's. A minimum of five years related experience and a BSEE or BS in Organic Chemistry is required.

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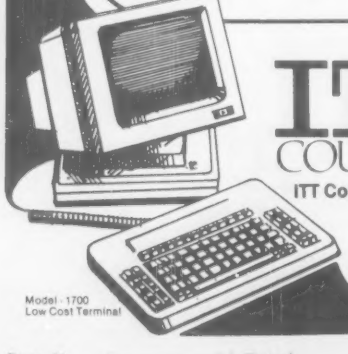

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PERIPHERALS: FIT TO BE TIED

Much of the functionality and applicability of personal computers is due to the availability of peripherals. For many, this is a hobby that has become an industry and promises to contribute to the computing revolution in which communications is supplanting transportation.

In 1982, there were distinct personal computer product omissions such as Winchester, expansion slots and memory. In 1983, the IBM Personal Computer XT and IBM expansion and Winchester units arose as an answer to these omissions. This has resulted in a

By Martin Alpert

ILLUSTRATION BY RICH TENNANT

MICRO MISSION

legitimization of the Winchester and the concept of an expansion cabinet. As is typical when IBM enters a market, the result is increased sales of these programs even for the third-party manufacturers. Most likely, there will be greater needs in memory and higher capacity Winchesters as a result of improved and more demanding software such as desk emulators, lab emulators and networking.

In 1982, the peripheral manufacturer needed to develop applications packages to support the hardware. In 1983, with IBM's PC DOS Version 2.0 operating system, the ability to add drives for the hardware was added. In the future, multitasking — the ability to run several programs at the same time — will be made available. Improved user interaction software will also be available. People like to know; they do not like to learn. The new wave of desk emulators provides an easy path to be able to use the full functionality of the computer without a long and demanding learning curve. This same support is necessary for implementation of peripherals.

Compatibility with the personal computer was the only major requirement in 1982, but this year, compatibility with look-alikes and other peripherals has become more important. IBM has developed guidelines for software developers. Similar guidelines are necessary for hardware developers. These will constitute an important and difficult requirement as more systems become available with various degrees of computer power and as these systems begin to communicate with each other.

Quality, reliability and support have been and will continue to be of greatest importance to the peripheral industry. They are key to establishing and maintaining user confidence in products and companies. Peripheral manufacturers need to solve problems, not just provide products. This requires very strong support with integration of software and hardware.

Pricing has become more competitive in 1983, but will stabilize. Companies need to provide adequate capital for growth and appropriate support of products. There are also price increases due to the allocation of parts. Furthermore, companies that have not been pricing products appropriately will begin to have financial problems. This will result in a painful lesson for many of the smaller companies and the industry as a whole.

There will be a continued trend toward multiple duplication of products. This is unfortunate because there is such a tremendous need for differentiated products. This is partly due to the low cost to enter the market. However, this will change as technology advances and the cost of new product development escalates. Product promotion and marketing have become the major cost in selling new products.

A synergism has developed between the computer manufacturers and third-party peripheral manufacturers, and the growing availability of peripherals has resulted in increased computer sales. For example, the availability of analog-to-digital converters has led many users to purchase computers that are to be used in the laboratory.

Commodity Product Profile	Specialty Product Profile
General Use	Industrial/Scientific, Education
Very Large Market Size — For Limited Number of Products	Moderate Market Size — For Large Number of Products
Multifunctionality	Unifunctionality
Mail Order Potentially Viable	Requires More Support
Traditional IBM Market	IBM Viewed as Overpriced
Types of Products: • Winchester • Multifunction (Memory) • Networking* • Graphics*	Types of Products: • A/D • IEEE 488 • Video Digitizer

* Not yet proven

Figure 1. Commodity vs. Speciality

Classification	% Influence	Future Significance
Product First	25	↓
Retail Price	20	→
Dealer Margins	15	→
Configurations	10	↓
Software Support	9	↑
Compatibility	7	↑
Performance	6	↑
Support	5	↑
Name Recognition	2	↑
Ease of Use and Installation	1	→

Figure 2. Priority Profile for Commodity Products

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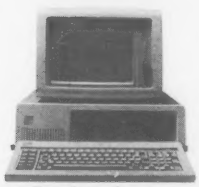

13. Provide word processing and mainframe access to administrative assistants with Administrative Peachpak...

14. Give the graphic arts department direct mainframe access with Graphics Peachpak.

15. Save time because mainframe data is automatically loaded into your PC...

16. So you free up data processing resources...

17. And you don't have to key in data yourself.

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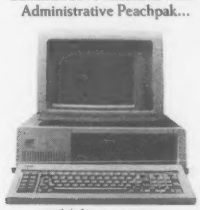


19. Make a capacity analysis using a PC and mainframe manufacturing information...

20. Summarize your findings in a report using PeachText...

21. Eliminate spelling errors with a built-in Spelling Proofreader.

22. Analyze overtime percentage on your PC, using data from MSA's Payroll/Personnel System...

23. Make timely manpower adjustments to maximize productivity...

24. And revise departmental salary projections on your PC.

25. Download vendor history from MSA's Accounts Payable System...

26. And use PeachCalc to do comparative analysis.

27. Use PeachLink to download information from both MSA and non-MSA online mainframe systems....

28. Create custom online formats with Easy-Screen!™

29. Or use standard formats provided by MSA.

30. Download a financial report from the mainframe to your PC...

Turn Page ▶

31. Add footnotes to a balance sheet using PeachText...

32. Project next month's income with PeachCalc...

33. Change sales estimates and recalculate income projections instantly.

34. Download names and addresses from your mainframe...

35. Use the List Manager and PeachText to do a mailing informing customers of a special announcement...

36. Or create a mailing to vendors requesting bids.

37. Using personal computer telecommunications, access up-to-the-minute exchange rate information...

38. Use PeachCalc for float analysis...

39. Display current exposure with a graph...

40. Update MSA's mainframe Foreign Exchange System.

41. Use PeachLink to distribute mainframe data to your other offices across the country...

42. Use a PC at those remote locations to print reports...

43. Graph expenses by location, department or by a single product line...

44. Print checks in remote locations from mainframe Accounts Payable data.

45. Create a salary administration worksheet on a PC using MSA's Payroll/ Personnel System...

46. Produce a workforce utilization model using PeachCalc...

47. Monitor turnover using Business Graphics...

48. And, for a printed copy, route your Business Graphics output to a plotter or printer.

49. Use PeachLink to get economic data from MSA's Forecasting and Modeling System...

50. Use PeachText to prepare a corporate planning policy document...

51. Refer to a built-in Random House® Dictionary while writing the report.

52. Link to mainframes under operating systems OS, DOS, and SSX...

53. Use all standard online monitors, including CICS, IMS-DC, IDMS-DC, TSO, CMS and ICCF.

54. Assist your auditors by giving them access to mainframe data...

55. And the convenience of PeachText word processing...

56. Give them access to current customer and vendor information for letters of confirmation...

57. And an easy way to prepare notes to consolidated financial statements using PeachText.

58. Extract delinquent customer invoice information from your Accounts Receivable System...

59. Personalize a dunning letter with your micro software...

60. For help, call up 30 synonyms instantly using PeachText's Random House® Thesaurus.

61. Use mainframe Inventory and Purchasing data to graph inventory use by department on your PC...

62. Make a purchase order adjustment without leaving your workstation.

63. Download current balances from General Ledger to graph actual vs. planned...

64. Do a breakeven analysis by department.

65. Analyze overtime percentage by department on the PC using MSA's Payroll/Personnel System...

66. Use PeachText to prepare a memo summarizing your analysis and attach it to a graph.

67. Download employee data for an upcoming salary review...

68. Complete the salary review on your PC...

69. Enter the salary adjustment from your PC to the mainframe...

70. Make salary projections on your PC using mainframe payroll data.

71. Capture data from MSA's Fixed Assets System...

72. Use PeachCalc to create a lease amortization model...

73. Perform a TEFRA depreciation analysis.

74. Get database-to-database transfer with Database Sharing...

75. Download an entire report with the touch of one key...

76. Access it instantly, without data processing involvement...

77. Enjoy a realtime environment, no waiting for batch processing.

78. Access available funds data in MSA's Budgetary Control System...

79. Use PeachCalc to project expenditures through year-end.

80. Download data from MSA's Capital Expenditure Tracking System...

81. And analyze cash flows for an investment analysis decision.

82. Dial up subscriber databases to access current credit information for customers...

83. Use PeachCalc to analyze information and set credit limits...

84. And update your mainframe Accounts Receivable data.

85. Allow only authorized personnel access to the mainframe, due to built-in security.

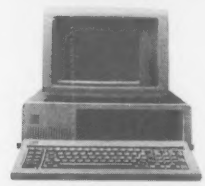
86. Instantly express numbers in bar, line and pie charts or other business graphics.

87. Add footnotes to mainframe reports, or customize mainframe documents.

88. Produce up to nine different kinds of graphs and charts with mainframe information.

89. Get HELP if you need it, with a built-in feature that guides you through the system.

90. Organize your information and mailing lists with your own List Manager.



91. Use mainframe information with the Business Graphics System to produce slides and transparencies.

92. Work productively at home, by dialing up the mainframe from your own personal computer.

93. Make late changes to reports generated on the mainframe.

94. Do budget forecasting using PeachCalc and your PC.

95. Review profit and loss statements at a moment's notice on your PC.

96. Improve the productivity of your staff with simple-to-use software for personal computers...

97. Enjoy the convenience of a complete menu-driven system...

98. Use over 20 pre-defined applications from MSA.

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MICRO MISSION

Furthermore, the same computer used in the lab will be used in both the user's office and his secretary's office. In addition, an after-after market is currently developing. This market is for the peripherals used by the peripherals. For example, people who purchase a BSR X10 controller need the BSR X10 and submodules as well.

Another interesting phenomenon is the differentiation between product life cycle and market life cycle. For example, there was a very brisk market for memory initially. This has changed to a multifunction board market. The market life cycle for memory still exists, but the product life cycle has changed.

The market segments that have distinct peripheral requirements are business, industrial and scientific, home and education. In the business market, IBM has been well-known and respected. There is a feeling that you cannot go wrong with IBM and that owning an IBM computer is a sign of success. The peripheral needs of this market are simple but the volume of the market is large. They include commodity-type products such as memory. Future needs will be more related to communications, such as telephone support. They are sensitive to initial support.

In the industrial and scientific area, IBM has an image of being overpriced and has not been well-represented. This is changing, though, as recognition of the Personal Computer as an industry standard grows and as the availability of multiple specialized peripherals also grows. The volumes in this sector are moderate, and there is also a greater sensitivity to ongoing support.

Classification	% Influence	Future Significance
Product First	25	↓
Software Support	25	↑
Performance	15	→
Retail Price	15	→
Support	10	↑
Retail Margins	5	→
Name Recognition	5	↑

Figure 3. Priority Profile for Speciality Products

IBM is well-known and respected in the home market. Peripherals specifically for the home have been low-volume products. This market segment, though, will be one of the fastest growing segments in the future. Users in this market are sensitive to support at the initial installation. The peripheral manufacturer has an increased responsibility to provide easy-to-use, well-documented and highly reliable products for this market, since it includes many first-time users.

The educational market has also recognized the Personal Computer as an industry standard and is beginning to implement a large variety of peripherals with an emphasis on visual and audio processing.

The commodity products are found primarily in the business segment, whereas the speciality products are found more in the industrial and scientific and education markets. The home market segment currently appears to be functioning with the specialty product profile, but long-term is expected to act with the characteristics of a commodity product profile. These characteristics are defined in Figure 1 on Page 52. The user priority profits for each of these segments are defined further in Figure 2 (Page 52) and Figure 3.

The distribution channels used have primarily been through dealers. There will be increased support through distributors in the future. Mail order for selected commodity products may be viable, but this channel can offer only limited support. This support is important to the large number of first-time computer users. Institutional sales, in which IBM sells in large volume to one company, are a viable market for third-party peripherals. The OEM market is increasing rapidly as products are being developed around the personal computer. International sales are also increasing as the personal computer attains greater acceptance in these markets.

The viability of the third-party peripherals market depends on supporting IBM products. This involves implementing new technology rapidly, developing more specialized products with hardware and software support and providing an emphasis on communications products.

The peripheral market is growing rapidly along with the personal computer market. Personal computer users are seeking new functions for their micros, and these functions are provided by peripherals. Therefore, a cumulative pattern is resulting in a rapidly growing third-party hardware market. It is these peripherals that give personal computers a personality. ♦

Alpert is president, Tecmar, Inc., Cleveland.

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MATRIX MANIA: THE EXPANSION OF SPREADSHEETS

The usefulness of the electronic spreadsheet in financial applications is so widely known and seems so self-evident that it is strange to remember that less than five years ago most businessmen had not heard of Visicorp's Visicalc. And it is even stranger to recall that Visicalc was once the only electronic spreadsheet, the innovative progenitor of business-oriented software for micros. Today, the challenge is not to understand what the electronic spreadsheet is and how to use it, but to make a rational and optimal choice among the numerous and diverse offerings. It is necessary to do this without investing more time than one would save in using the software.

Although Visicalc is available for just about every micro above the level of toy and has some unquestionable virtues — not the least of which is its widespread knowledgeable user base and the numerous books on its applications — there are significant features available in other electronic spreadsheets. These spreadsheets offer the user new flexibility, whether in learning materials, ease of use, formatting reports, built-in advanced functions or the integration of other generic types of software within the same package. There are literally dozens of good electronic spreadsheet packages, some standalone and some intergrated with other generic functions. This article will consider five: Context Management Systems' Context MBA; Lotus Development Corp.'s Lotus 1-2-3; Microsoft, Inc.'s Multiplan; Advanced Visicalc; and Micro Data Base Systems, Inc.'s Knowledgeman. The first four spreadsheets are in widespread use, and the last is a newcomer with a particularly distinctive feature. Now that there is a rich choice available, selection criteria

By Hannah I. Blank

include more than functional characteristics. They include ease of use, speed of operation, quality and comprehensiveness of the learning and reference materials, the responsiveness of the vendor and prospects for future enhancements.

The importance of each criterion depends on the type of user you are. Are you a beginner with micros or a novice with some hands-on experience? Are you a DP professional who knows how to get acquainted with hardware, software and operating systems? Are you patient with detail and willing to study a manual meticulously to ferret out specifics on what interests you? Or are you an executive who wants instant results and who wants to press a button and have the machine work in a self-evident way? Are you willing to trade some of your time for eventually having facility to use advanced functions or is instant capability of paramount importance to you? Do you prefer to learn something by reading about it, hearing about it or trying it?

The way you apply the criteria also depends on the type of applications you have. Are they large complex models, using data from various sources and likely to be stored in different files? Will you need to use complex mathematical functions? How important is graphic representation of data? Will you want to produce professional-looking reports for presenting to others or will the barebones results of your analysis, obtained as quickly as possible, be enough to meet your critical needs?

Elaborate learning materials will not be helpful unless you use them. Think about this. If you would rather be taught by someone how to use a package than study the learning materials on your own, then your choice of package will be guided to some extent by the availability of knowledgeable associates who will help you. And if they are all using Multiplan, for example, then that is the package you would do well to consider if it meets all your other criteria sufficiently.

If you feel you need to take a course — most people do not, except to build confidence — then you are constrained to packages for which courses are taught. But if you are willing and able to work alone with self-instruction materials, then your choices are wider.

Learning and reference materials vary in type, quantity and quality. All of the packages discussed here are of satisfactory quality or better.

However, specific offerings do differ. The tutorial portion of the manuals for Advanced Visicalc and Multiplan each take you step-by-step through examples you should perform on your system as you go. In my view, this is a good way to learn. The manual for Context MBA includes a similar step-by-step tutorial. In addition to the manual, Multiplan provides a tutorial diskette with sample data on it so that you can practice the commands before knowing how to create a new file. Knowledgeman also offers demonstration diskettes. Currently, the manufacturer of this newest offering has indicated that still further learning materials will become available.

Lotus 1-2-3 provides an outstanding tutorial diskette. It consists of six lessons, each on the basics of a different aspect of the package, such as getting started, spreadsheet, data management and graphics. The many more advanced features of 1-2-3 are not taught on the tutorial diskette. You must use the reference manual with the package.

Knowledgeman also provides a tutorial, but getting started with this package is more complex than with some packages. The newcomer to micros may have difficulty.

Help On-line, a feature of Multiplan and Lotus 1-2-3, lets you access an explanation of commands without exiting your work.

The most important differences between electronic spreadsheets include reporting flexibility, built-in advanced functions and the ability to set up complex functions or procedures tailored to your own application. One of the most irritating limitations of the early Visicalc was the inability to vary the width of a column to conform to the width of one's data. Formatting possibilities are now very rich, and each of the five examples offers impressive, but not identical reporting capabilities.

These include formatting of individual cells, variable-width columns, incorporating graphics and text within the same report as the spreadsheet, producing spreadsheet results as bar charts, selectivity of rows and columns for a report. None of these functions were available originally.

Hundreds of functional characteristics could and have been isolated for comparison purposes. In my book, *Mastering Micros* (Petrocelli Books, Inc.; Princeton, N.J; July 1983), I identify 93 that are just related to advanced spreadsheets. Some of these are reproduced in the figure below. In general, however, two or three particular functions will make the difference to a given user, depending on the application. For example, an important function is the ability to sort rows. One user may never need this function, while another will be seriously inconvenienced without it.

Look for the one that has everything you need and which you find comfortable to learn and use. Obviously, if you already have a computer, you must also ensure that the package you want runs on it.

If, for example, you are building econometric models, note that Multiplan provides a function to allow you to solve recursive equations. You could also do this with 1-2-3 by setting up a macro. If you do not know what recursive equations are, but want to upgrade from early Visicalc to a more flexible package, then your best bet might be Advanced Visicalc, which retains the same command structure you have already learned. The figure shows the distribution of several functional characteristics, a small subset of those possible to find.

The integration of other generic types of software with the electronic spreadsheet has been attracting considerable attention in the corporate environment.

The results of a financial analysis performed using an electronic spreadsheet can be dramatized and made more senior executive-friendly with well-chosen graphics. A written report would include text as well as columns of numbers. You might also want to use the data processed in your financial analysis in different report formats available in data management software. Thus, graphics, data management and text processing software, if integrated or easily transferred to electronic spreadsheet software, allow you to produce all the elements of your analysis, not just the number crunching.

Furthermore, the information may need to be communicated to a corporate data center's mainframe. Therefore, compatible communications software would be a useful add-on. One or more of these generic categories of software are available with some electronic spreadsheet packages.

It should be noted that the data management available in Knowledgeman goes far beyond the simple sorting and selecting of records available in other spreadsheet packages. Knowledgeman contains a full-fledged relational data base management system comparable to Ashton-Tate's dBaseII and in some ways more powerful. This function can be particularly significant for applications developers.

On the other hand, it is not as easy and quick to learn and use as much of the other software. It will probably be selected by the user who needs a powerful data base management facility first, with the electronic spreadsheet of secondary importance. A significant advantage of this package is that elements from the tables built using the data management capability can be used in the electronic spreadsheet. Lotus 1-2-3 allows storing of spreadsheet data as records in a file, with consequent convenience and memory conservation. In this, as in selecting software for any other functional characteristics, it is best to examine and try out a capability that is important to you, rather than depending on specifications or reviews. Reviews should be used as guides, only to point you toward feasible packages.

Remember that responsible software publishers seek to improve their products, and often new releases of a given package will contain new features. The commitment and reputation of the software publisher may be a worthwhile consideration.

It should be remembered that responsible software publishers seek to improve their products, and often new releases of a given package will contain new features. The commitment and reputation of the software publisher may be a worthwhile consideration in selection.

Several aspects of each of the example packages are worth citing. An aspect of Multiplan that is worth considering is that Microsoft's text processing package, Microsoft Word, contains the same command structure as Multiplan. If you know one, the ease of learning and using the other is obvious. Whether Microsoft will enable files to be transferred from one to the other can only be speculated on at this time. Furthermore, since Microsoft Word may be operated with the Microsoft Mouse, that capability can be anticipated for Multiplan at some point, too.

Visicalc IV, which may be available by press time, is described as having graphics capabilities and other features beyond those incorporated into Advanced Visicalc. Watch for this.

In addition, Lotus Development has expressed a commitment to produce software in the 1-2-3 family, which will add to the generic capabilities for business use. Knowledgeman's manufacturer has announced its intention to add to the array of tutorial materials available. As a new offering, Knowledgeman can be expected to develop further.

By focusing on your own needs first, and then and only then on what is available, you will be able to keep your head amid the dazzling number of options available. ♦

Blank is vice-president, management information systems, domestic institutional banking, Chase Manhattan Bank, New York.

	Context MBA	Lotus 1-2-3	Multiplan	Advanced Visicalc	Knowledgeman
Split Screen	4	8	4	2	No
Name Cell or Variables	Yes	Yes	Yes	No	*
Net Present Value	Yes	Yes	*	Yes	*
Internal Rate of Return	Yes	Yes	*	Yes	*
Linear Regression	No	*	*	No	Yes
Sort Rows	No	Yes	Yes	No	Yes
Recursive Equations	No	*	Yes	No	*

** Not built-in, but provides facility to do*

Adapted from Mastering Micros *by Hannah I. Blank and reprinted by permission of Petrocelli Books, Inc.*

Functional Characteristics of Advanced Spreadsheets

E·X·T·R·A·!

PORTABLE PRODUCTIVITY

The portable personal computer is fast becoming one of the most prominent productivity tools available to today's executive. By giving businessmen the ability to take their information processing power with them wherever they go, portable computers are changing the way the world does business and creating unprecedented opportunities for advances in personal productivity.

These portable machines, whether slightly larger than a pocket calculator or the size of a small suitcase, are presently riding the wake of the burgeoning personal computer market. The personal computer industry is only about seven years old, and the portable computer industry is less than three years old. Even though these two industries are still in their infancy, there are already more than 150 manufacturers of personal computers, of which 45 are marketing machines classified as portables. The overall market for personal computers was approximately $4.7 billion in 1982, and industry analysts predict it will grow to more than $23 billion in 1987. But even though such figures are

By William Murto

impressive, the market growth for portable computers is expected to be even more mind-boggling.

Research firms across the country predict that portable computer sales will increase nearly tenfold during the next five years. The $434-million market of 1982 is predicted to grow to more than $4.5 billion by 1987, and one New York-based marketing research firm predicts that two out of three personal computers sold in 1987 will be portable models.

The popularity of the portable computer reflects fundamental changes in the business world. In the recent past, the vast majority of executives did not have access to any kind of information processing power. But with the introduction of personal computers in the office and with increasing availability of online data base services, managers have come to depend on information processing capabilities throughout their daily routines.

A portable computer is self-contained and can be moved from one place to another without requiring two hands or the aid of a colleague. More specifically, portables either fit snugly within a briefcase or they require their own specially designed case.

With dozens of portable computers on the market, it has become hard to keep up with what is being offered. It has become just as difficult to determine exactly what a portable computer is. Broadly speaking, a portable computer is self-contained and can be moved from one place to another without requiring two hands or the aid of a colleague. More specifically, portables either fit snugly within a briefcase or they require their own specially designed carrying case.

All but the high-end, full-function portables trade off power or feature to achieve portability. Some have tiny, hard-to-read display screens. Others sport condensed keyboards other than the standard Qwerty arrangement with which the majority of today's business world is familiar. Many portables cannot support the bulk of today's personal computer peripherals, and the majority cannot run most of the applications software being written for the industry's standard machines, such as the IBM Personal Computer and Personal Computer XT.

Today's portables can be divided into several descriptive catagories: the handheld units, the lap-top computers, the transportable units and the integrated portables. These machines range in weight from several ounces (the handheld units) to more than 30 pounds (the transportables).

The handheld units, just as their name implies, are typically not much larger than a hand calculator and generally run on batteries. They are limited in function and are normally little more than a combination of a hand calculator and data entry terminal.

The lap-top computers fit smartly into most briefcases and are considerably more powerful and capable than the handheld types. However, these versions have limited display screens and limited memory. They are also limited by the applications programs they can run.

The most popular category — the transportable units that are approximately the size of a small suitcase — offer full personal computer capabilities in a self-contained unit that can be moved easily from the office to wherever an executive needs complete computing power. Approximately half the manufacturers in the portable market offer computers that fit into this category.

Products in the other category — integrated portables — have been introduced in the last year and do not readily compare with portable models in the mainstream of the market. They are similar to transportables, but also have printers, acoustic couplers, modems or other special-function peripheral capabilities. These descriptive categories provide a basic yardstick for comparing visual differences between machines. Another way to look at the market for portables, however, is to categorize them by their use. When looking at utility, two general characteristics emerge that broadly define the marketplace. At the low end are special-function portables — small machines, usually lap-tops, that perform specific applications and address the needs of certain well-defined niches in the market. These trade off much of the power and many of the features of full-function personal computers in return for smaller size.

At the high end are full-function personal computers that are also portable. For many corporate and professional executives, the prime consideration is whether the portable computer is powerful enough to perform all the computing tasks that the personal computers they work with at the office can perform. The corporate user is also concerned about whether the portable computer can run the largest base of professional productivity and applications software possible and can support the

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standard hardware enhancements and peripherals found in most corporations.

In a growing number of instances, that involves acquiring IBM-compatible machines, since the IBM Personal Computer has become an industry standard and the computer of choice in a constantly growing number of organizations.

A full-function portable computer makes no compromises. It trades no features in achieving portability and provides the processing power, expandability and upgradability needed by today's executives.

When it comes to processing power, 16-bit power is now standard. And many of the most popular business and productivity software programs also require at least 128K bytes of random-access memory as well as a substantial amount of disk storage. Full-function portables usually have at least one 320K-byte disk drive, and the most popular and useful accommodate two.

Corporate executives are becoming increasingly familiar with today's improved information services and productivity tools, which results in their desire to have the most up-to-date information when and where they need it. For this reason, flexible information processing resources have become synonomous with increased productivity.

When today's executive is needed for analytical decision making in a regional office, at a board meeting two floors up or during the year-end crunch that might require work at home, he needs on-site access to computing power. And portable computers provide the flexibility of taking that power where it is needed.

Many Fortune 1,000 companies have set corporatewide standards for personal computers to improve personal productivity throughout the organization. And in the majority of cases, they are standardizing around the IBM Personal Computer and Personal Computer XT. The next step for most of these organizations has been to leverage on the standards they have set by adding portables that are compatible with the desktop personal computers in their offices.

Uses for portable computers seem limitless. For example, Citicorp in New York is developing a worldwide network of IBM Personal Computers and Compaq Computer Corp. Portable Computers. This network will give Citicorp inspectors around the world the ability to access the data base of the corporation's international network of mainframe computers.

Therefore, inspectors have independent data processing power for operations and financial auditing of Citicorp's branches and affiliates in more than 90 countries.

PORTABLE PRODUCTIVITY

Portables are also found in a number of major financial institutions in which field personnel and account representatives have stored client information on floppy disks that can be carried along with the portable computer. It is easy to keep the stored data current and to provide more accurate "what if" estimates of the possible future performance of their client's investments.

But portables are not only for those who travel. Many companies are buying them for work in-house because they are easy to move from office to office or from office to conference room. Other companies have found that their executives prefer them simply because they take up less space on their desks and fit more comfortably into their working environment.

Executives are becoming familiar with today's improved information services, which results in their desire to have the most up-to-date information. For this reason, flexible information processing resources are synonomous with increased productivity.

At home, portables are convenient not just because they can be easily carried to and from the office, but also because they fit more comfortably into the executive's weekend work space. It is no longer necessary to turn the study or den into a computer room with a multicomponent desktop unit.

On a more personal level, many companies are using portables in programs to introduce general managers and executives to the world of computing. Because portable computers fit so well in the office and can be moved so easily, they are much more personal machines, aiding nontechnical individuals to overcome their computerphobia.

Such applications barely scratch the surface of portable computer use. And these applications generally refer only to the higher end portables — that is, the full-function machines that are every bit as powerful as the high-performance desktop computers. These models are but one segment of the portable computer industry.

As executives and managers become more sophisticated computer users, they will attack more difficult business problems and will require more extensive computing power.

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MICRO MISSION

For this reason, it is extremely important that the portable computer have the potential for adding internal memory, external storage and the growing array of peripheral devices that greatly expand the portable's capabilities.

Also, as better local-area networking schemes become available and as more and more portables act as intelligent terminals used to access corporate data bases, it will become increasingly more important that the portable computers can be upgraded. This requires the ability to use the array of micro-to-mainframe links that allow users to access corporate data bases and give the portable the ability to act as an intelligent terminal — which in the case of an IBM shop means 3270 emulation. Generally, it means anything that enables the user to function as an integral part of the expanding corporate information infrastructure, rather than simply using the computer strictly for personal stand-alone applications.

Functioning as part of the corporate information structure requires compatibility with corporatewide hardware and software standards. IBM compatibility is important, because IBM's Personal Computers have cornered the largest portion of the personal computer market.

Compatibility with these machines is available in various degrees. The corporate purchaser must consider whether the portable model will support all the hardware peripherals and run all the applications software that will be required. The most powerful units will support all peripherals designed for the IBM Personal Computers and run without modification all the software written for those machines.

Applications software packages available for the IBM Personal Computers and IBM Personal Computer-compatibles provide the largest base of personal productivity solutions available. In addition, more sophisticated applications software is becoming available for business planning, financial management and accounting functions.

These more powerful software programs, such as Lotus Development Corp.'s 1-2-3, Visicorp's Vision and Quarterdeck Office System's DesQ, when running on high-performance portable computers, are initiating an entirely new generation of personal productivity.

These programs provide corporate users the convenience of moving automatically from an expansive electronic spreadsheet to graphs and line charts and to word processing capabilities that allow for drafting financial reports and other business summaries.

With Vision and DesQ, users can work on the screen with more than one program at a time. These new packages, which are becoming more commonly known as operating environments, allow users to split their display screen into several different work areas. Users then can view and manipulate the data stored in a number of programs simultaneously.

The dramatic personal productivity gains made possible by this new computing generation are just beginning to surface. And the coupling of these sophisticated software products with the increasingly more powerful, full-function portable computers is creating more productivity opportunities. Essentially, executives have all the power of the high-performance minis of just several years ago available in a portable package.

These opportunities will become even more prominent as the fruits of portable computer manufacturers' research and development efforts surface in the market. Anyone familiar with this market over the past several years knows the general trend, typified by products such as the early pocket calculators in the '70s.

The first models were bulky and expensive, but technological advances reduced considerably the tools' size and price while significantly bolstering functionality and power. The same is happening — and will continue to happen — with portable computers as manufacturers continue their substantial investments in future product development.

More powerful microprocessors, including the 32-bit micro on a chip, should eventually be available, as will smaller, denser forms of media and better flat-panel display technology. And those examples are but the most obvious.

It appears that portable computer manufacturers will move in one of two directions. Some will offer smaller but more powerful, high-performance, full-function portables that make no trade-offs in achieving portability. These will be most useful to the manager who requires all the power and software availability of a desktop computer in a portable package. Others will continue to cater to specialized, vertical markets with portable models designed to perform specific applications that sacrifice full functionality for portability.

Users concerned about which vendor to buy from should look for manufacturers that display a corporatewide commitment to quality. This commitment must extend from product development to manufacturing quality to excellent distribution channels to top customer service.

The successful portable computer manufacturers will be those that address this commitment over the long term and, in addition, those that can react quickly in a dynamic market.♦

Murto is vice-president of marketing, Compaq Computer Corp., Houston.

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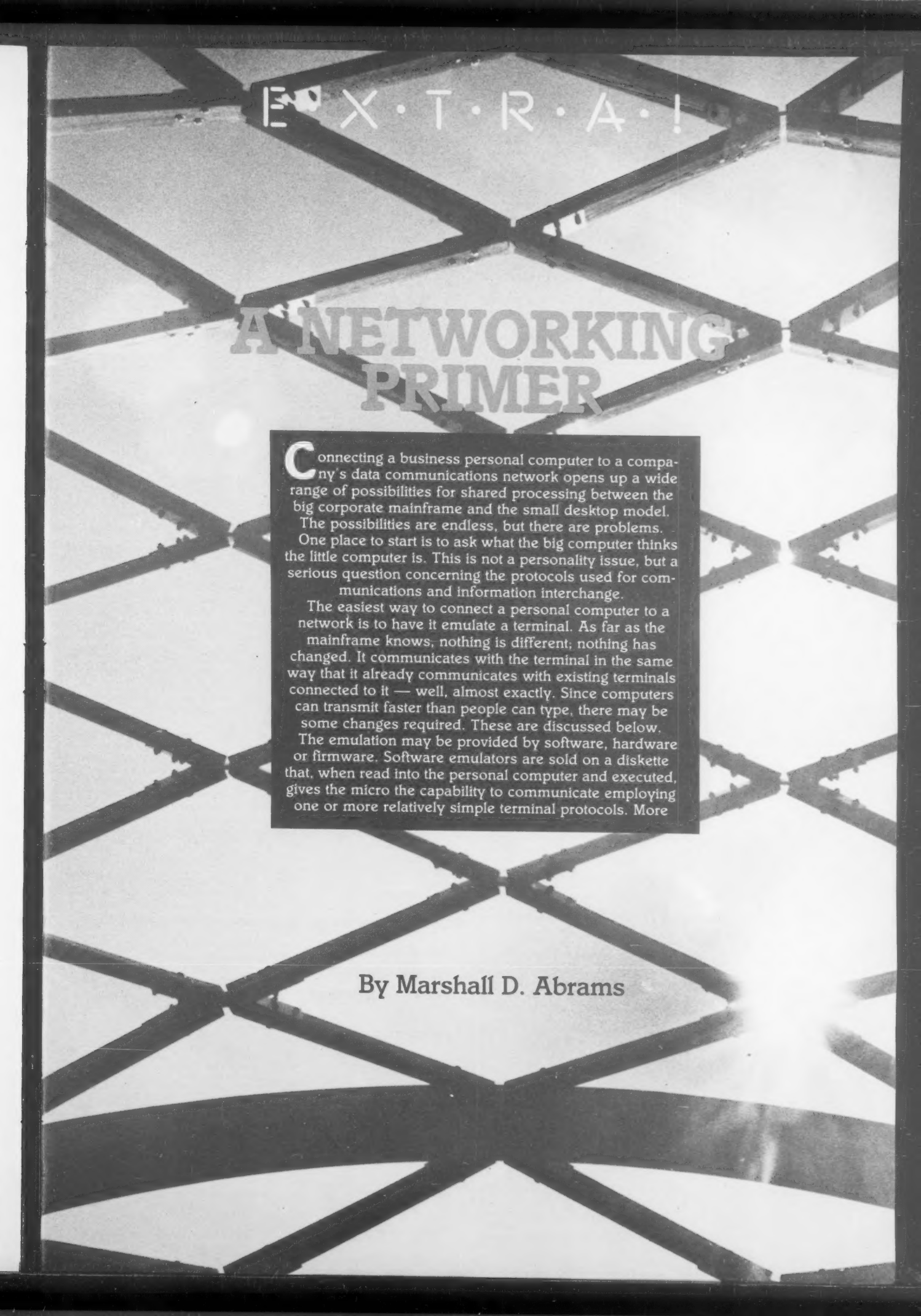

E·X·T·R·A·!

A NETWORKING PRIMER

Connecting a business personal computer to a company's data communications network opens up a wide range of possibilities for shared processing between the big corporate mainframe and the small desktop model. The possibilities are endless, but there are problems.

One place to start is to ask what the big computer thinks the little computer is. This is not a personality issue, but a serious question concerning the protocols used for communications and information interchange.

The easiest way to connect a personal computer to a network is to have it emulate a terminal. As far as the mainframe knows, nothing is different; nothing has changed. It communicates with the terminal in the same way that it already communicates with existing terminals connected to it — well, almost exactly. Since computers can transmit faster than people can type, there may be some changes required. These are discussed below.

The emulation may be provided by software, hardware or firmware. Software emulators are sold on a diskette that, when read into the personal computer and executed, gives the micro the capability to communicate employing one or more relatively simple terminal protocols. More

By Marshall D. Abrams

complex terminal emulators are packaged on a circuit board that plugs into the personal computer. The board contains hardware, firmware and possibly additional memory to support more complex protocols.

The program controlling the personal computer has to be able to emulate the communications protocol of the chosen terminal. Purchasing or writing this software requires knowledge of exactly what this protocol is.

In data communications, protocol refers to all the rules and procedures that must be followed in order for two entities to communicate and interoperate. A protocol usually incorporates a number of existing standards and may introduce some new areas of standardization.

Sometimes the protocol is well-defined by a public standard such as Ansi X3.64-1979. This standard defines a set of encoded control functions to facilitate data interchange with full-screen addressable video terminals and other two-dimensional addressable devices. These control functions are an extension to the Ascii code set. The types of controls include editing functions, formatting and the specification and control of input.

Sometimes the protocol is defined by a vendor — for example, the IBM 3270 series of terminals. These terminals are defined by IBM specification documents, which make it possible for other vendors to build compatible terminals.

Both public and vendor protocols involve standards documents that specify the communications protocols employed by the terminals. Such documents provide a firm design target. In addition, the documents provide an authoritative reference to decide questions of right and wrong if it becomes necessary to do so.

A third alternative is the "common law" of terminals, which is derived from precedent. The precedence is usually based on some prior example of the terminal art. The most common way of naming a protocol is to refer to the first or predominant terminals to use it. For example, the most common citation of precedence is TTY-compatible. TTY is an abbreviation for Teletype, an asynchronous terminal produced by Teletype Corp.

If pressed, the person citing the precedence will probably come up with Models 33 and 35 as the prototype. Unfortunately, these models were uppercase only and lacked a number of features currently taken for granted. There are newer TTYs, including Models 37 and 40, but most terminals claiming TTY-compatibility support less than 100% of the features of these terminals. In addition, they may sport various unilateral extensions or new features that the vendor thinks the market will appreciate.

If the micro and the mainframe recognize and respect each other as computers supporting appropriate protocols, the possibility of distributed processing exists. Files can be transferred between computers under control of file-transfer protocols. Electronic mail can be exchanged under control of computer-based message system protocols. Anything that can be done between computers on a network — when the computers conform to the network protocol — can be accomplished. This is limited, of course, by the capacity of the small computer.

Note the dependence on protocols. In fact, when the issue escalates to networks, the set of protocols is called an architecture. Not many personal computers today support a network architecture, but it is wise to be alert for future developments.

It is necessary to examine the functions and problems of using the small business personal computer in cooperation with the corporate mainframe over a data communications network. The most common terminal programs that emulate TTYs — admittedly an imprecise specification — will be discussed first.

If the micro and the mainframe are to engage in any form of distributed processing, information must be transferred between them. This is called file transfer, even if less than an entire file is exchanged.

File transfer from the micro to the mainframe is not much of a problem. As far as the mainframe is concerned, it is accepting input typed by the user at a terminal. The user must first issue an appropriate command to the mainframe to input information into a file. Some operating systems have a command that does this directly; others require the use of an editor to accept such input.

Next, the user instructs the small computer to transmit a file. When the transmission is completed, the user must send another command to the mainframe to inform it that input is terminated and that the file should be closed.

Mainframe-to-micro file transfer is accomplished by first setting the personal computer to capture or copy everything it receives from the mainframe. The copy may be stored on disk or in memory. It probably can be toggled on and off by use of function keys. Once the small computer is ready to receive, the user instructs the mainframe to send the desired file to the terminal. When the transfer is completed, the user instructs the small computer on file disposition.

Sometimes one of the computers transmits faster than the other one can accept. The solution to this problem is flow control. Flow control gives one computer the ability to tell the other to stop transmitting and subsequently to resume transmitting. The TTY prototype for flow control was the paper tape reader. The computer could turn it on and off as necessary by transmitting the Ascii control character Device Control (DC)1 and DC3. These characters are also known as X-ON and X-OFF.

Other control characters can be employed, and the principle remains the same. In the IBM world, similar control characters were used to lock and unlock the keyboard of the 2741-type terminal to prevent the user from sending input when the computer was unable to accept it.

These same control characters are usually interpreted to halt and resume input from the personal computer emulating a terminal to the mainframe. The small computer's terminal emulation program must recognize these characters and take appropriate action: It must stop immediately without losing any data.

In most cases, this protocol is symmetrical. The small computer emulating a terminal can control output from the mainframe using the same control characters. A difficulty occurs when the mainframe only operates in half-duplex mode — that is, it transmits or receives, but not both at the same time. In this case, the mainframe cannot receive a control character such as DC1 to stop transmitting. This is a serious problem that may require extensive programming to overcome — if, indeed, it is solvable.

A related problem has to do with a required short interval at the end of each line transferred, where a line is defined to terminate with a carriage return or a line feed. One computer may need a short time interval to process a line before beginning to accept the next one. In addition, the mainframe may be programmed to allow time for the terminal to return the printing element to the left margin.

One way to allow the required time is to pause. But since timing is a complexity sometimes omitted, an alternative is to transmit a number of nonprinting characters to fill the required time. The delete or rub-out characters can be used. The file capture program on the small computer should be able to discard these padding characters on receipt.

If the mainframe sends other control characters at the beginning of each line, the terminal emulator must also be able to filter these. It is common for IBM operating systems to transmit a DC3 at the beginning of each line, and this must be removed by the terminal emulator.

This is probably the most complex problem in using asynchronous terminal protocols. TTY protocol does not have a suitable answer to error control. It provides parity for error detection, but this is so close to useless that most systems provide the option of turning it off. Parity error detection is often not used because it only provides an indication that an odd number of errors have occurred. The common operating system responses to a parity error do not provide a convenient correction mechanism.

An alternative to parity for users inputting at terminals is echoing.

ZENITH

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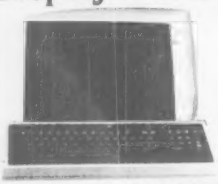

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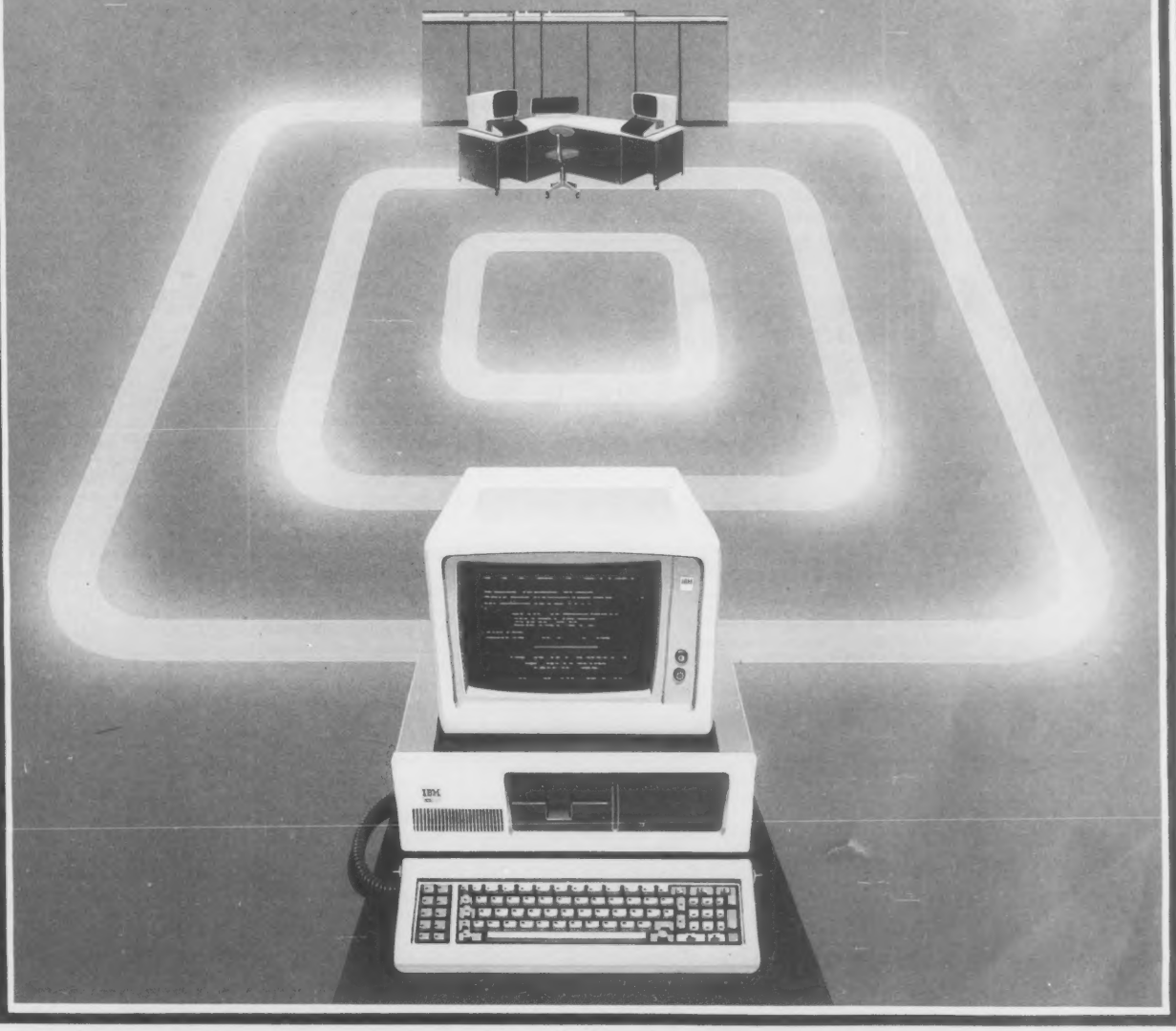

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With this method, characters input from the terminal are not displayed locally, but are transmitted to the mainframe and then retransmitted back to the terminal for display. Transmission errors in either direction cause the display to differ from what the user tried to type. If the user detects the error, he may use an editor or some other manual method for correction or may retransmit the data. Echoing is not appropriate for communications between two computers.

The most common treatment of errors is to ignore them. Despite the ostrich-like appearance of this approach, it may be the best thing to do under certain circumstances. One such circumstance is when the communications network provides error control internally. The only communications link that does not have error detection and correction is the one between the micro emulating a terminal and the network.

There are a number of programs available, however, for various personal computers to provide error control. In general, they all adapt some aspects of more complex protocols to the asynchronous communications environment. Some sort of check-sum is calculated and added to each transmission unit, which may be a variable length line or a fixed length block. If the receiving equipment detects a check-sum violation, then retransmission is used until an error-free transfer has been accomplished.

Both big and small computers must have programs to implement this error control protocol. Since the personal computer will probably implement the protocol entirely in software, the check-sum will not be as sophisticated as those used in synchronous protocols. As a result, the probability of an undetected error will be higher than is normally expected in synchronous transmission, but much lower than in unprotected asynchronous communications.

There are many other aspects to consider. There are many synchronous protocols in use today, including many character-synchronous protocols as well as the newer bit-oriented protocols. The character-synchronous protocols are generally identified by the model of the terminal they initially supported.

There are some terminal emulation products available for personal computers that support the more popular synchronous protocols, making it possible to replace one of these terminals with a personal computer.

In addition, the 3270-type terminal has two components, which may be packaged separately or in one unit. The first component is the workstation, consisting of the keyboard, display and associated electronics. The other component is the controller, which provides a protocol translation function between the computer to which it is attached and the workstation.

One terminal emulation method for personal computers is to emulate the workstation connected by a network to a centrally located controller. In this case, the connection to the workstation is often a coaxial cable. The emulation is provided by an expansion board that plugs into the personal computer and accepts the coaxial connector.

When considering file transfer between computers, it is important to differentiate between types of files. The sequential (Ascii) character stream class of files is the lowest common denominator file transferred among computers. It contains only a sequence or stream of Ascii characters. The Ascii standard definitions for these characters are observed.

In addition to the 96 printing characters, such files may contain functions such as carriage return, line feed, new page, horizontal tab and vertical tab. Assuming that the output device can respond correctly to the control characters and has sufficient rows and columns, a file of this class can be transferred among computers and displayed, printed or manipulated.

The second class of files contains embedded commands in addition to text. The purpose of these commands is to inform a text formatter or word processor program how the text is to appear when printed. These commands may or may not include printing characters. If they do include printing characters, they may be position-dependent. For example, some commands begin with a period in Column 1. Nonprinting commands may use some Ascii control characters in nonstandard ways or may include codes that are outside the Ascii character set.

File transfer involving embedded commands requires command conversion. There should be a one-to-one correspondence between commands on different systems. If there is not, the conversion becomes complex and is given a more descriptive name of protocol converters.

The third class of files, structured data files, includes everything beyond the two file types discussed above. In addition to the obvious complex structures of data bases, indexed files and PL/1, even numbers other than positive integers introduce problems. For numbers, questions arise concerning word size, binary or binary coded decimal representation of numbers, internal representation of negative integers and floating point.

Like embedded command text files, file transfer requires a protocol converter that is knowledgeable of source and destination structures. Such a converter could be written on a bilateral case-by-case basis.

Big computer support for more complex terminals is readily available. The simple serial scrolling glass-TTY terminal is being superseded by a full-screen addressable terminal. Terminals of this type include those which conform to Ansi X3.64, such as Digital Equipment Corp.'s VT-100; those which support IBM 3270 protocols; and others that have their own protocols.

The question of full-screen addressability protocols is independent of the synchronous/asynchronous protocol question. The VT-100 is an asynchronous terminal; the 3270 is synchronous.

Since a full-screen addressing terminal cannot be expected to receive information from the mainframe in a sequential character string, it is difficult to transfer data from the mainframe to the micro when the latter is emulating one of these terminals. One approach is to stop output from the big computer whenever a screen is filled with data and to scan that screen sequentially in order to capture the data. This is obviously a more complex data capture operation than for a simpler terminal.

The mainframe may support a limited number of protocols, at least for full functionality. If users need to connect another terminal type to this computer, it is necessary to provide protocol conversion. Protocol conversion includes synchronous/asynchronous protocols, alternate full-screen addressability protocols, structured data protocols and different communications protocols within the same synchrony. Protocol converters that perform some of these functions are currently available.

If the personal computer's terminal emulator produces a protocol different from the one the mainframe supports, a protocol converter is needed. The protocol converter may be software running in the mainframe, its communications front end or it may substitute for the front end or for the cluster workstation controller. It may be more cost-effective to emulate simpler terminals and to provide protocol conversion than to emulate more complex terminals. But features such as error and flow control should be considered along with cost. ♦

Abrams is an internal consultant on data communications, personal computers and related security at the Mitre Corp., McLean, Va.

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GOING TO BAT FOR DIVERSITY

In 1887, Buck Ewing changed the course of professional baseball history by inventing the padded catcher's mit. He reasoned that since different players have different needs, each player should use a glove designed for his particular position. Ewing's logic rings as true today as it did when his New York Giants won the pennant in 1888.

In the microcomputer market today, managers are realizing that a policy of uniformity in microcomputers may be a mistake. While the temptation is strong to encourage only one kind of microcomputer in an organization, such uniformity has hidden disadvantages. A team does not perform as well when each player must use a tool that is not suited for any specific position. All the players compromise, and

By Todd D. Doersch and Thomas J. Kosnik

effectiveness suffers. If we accept Ewing's wisdom and avoid uniformity, then the next temptation is to wait and buy later. There is a definite cost of foregoing the benefits that microcomputers can yield.

Because micros have quick payback, users can afford to reevaluate their needs often. The manager who bought an earlier microcomputer still faces the same broad choice available to the manager who hesitated, but the early adopter had reaped the first computer's benefits in the meantime.

There are over 300 hardware vendors clamoring for attention in the microcomputer marketplace, according to the 1983 *Computerworld Buyer's Guide*. In order to identify which microcomputers may be the best choice for specific needs within a company, it is helpful to create a framework that defines various types of users. This framework isolates two aspects of people's jobs: the diversity of their tasks and where those tasks are done. Combining the dimensions of mobility and task diversity yields a matrix with four quadrants. Each quadrant has a unique combination of characteristics, and each has distinct needs to be met by different microcomputers. The matrix, along with examples seen in various organizations, is illustrated in Figure 1. This segmentation points out that categorizing employees' needs based only on job title, functional area or management level is often misleading.

As shown in Figure 1, the nature of people's tasks can be labeled on a continuum ranging from one specialized task to many diverse tasks. At the specialized end of the spectrum, tasks have more structured routines. People on this end of the spectrum must master their area of specialization and are less concerned with coordinating the efforts of people in unrelated areas of the organization.

People at the diverse end of the spectrum are expected to be conversant in the jargon of many departments in the organization. There is less predefined structure to jobs at this end of the spectrum. A person's role is to contribute to several activities rather than to execute one activity.

Mobility is the second dimension used to differentiate people's needs. Microcomputers have injected more flexibility into the conception of the work place. People's tasks no longer need to be dependent on where the rest of the organization is. Professionals whose jobs require constant travel are at the high-mobility end of the spectrum. Their work pace should not be set by other organizational constraints. People at this end of the spectrum need to communicate often with others outside of the organization.

At the low-mobility end of the spectrum are people who are more reliant on the resources of their surrounding organization to be productive. Their tasks require heavy internal communications. They do most of their work in one location.

The four combinations of mobility and task diversity identify distinct segments within the same organization (see Figure 1). People in the high-mobility, specialized task quadrant need a tool designed to help them perform their tasks while away from the home office. This is labeled the "Outfielder" quadrant. Outfielders in baseball must move quickly, catching fly balls and throwing to the appropriate baseman. The outfield position involves less coordination with other team members than the infield positions. The outfielder's tool, his glove, is designed to help him do his specific task. Microcomputers should also be task-specific tools in this quadrant.

Figure 1. Market Segment Profile

Figure 2. Fit Between Product and Segment

"Shortstop" refers to the quadrant with high mobility and diverse tasks. Like the shortstop, whose job changes depending on the batter's strengths, people in this quadrant must be versatile. They need a portable tool that makes them more productive whether they are dealing with words, numbers or pictures.

The low-mobility, specialized task quadrant is labeled "Catcher." The catcher of a baseball team wears cumbersome protective gear, an indication of how dependent he is on his teammates' performance. The catcher communicates constantly with the pitcher and other infielders. His primary task is to catch a projectile whistling his direction at almost 100 mph — and do it 150 or so times per game without missing.

The analogy holds in business as well. People in the "Catcher" quadrant need gear that is designed to accomplish a few specialized tasks, often involving heavy communications within the organization. For example, an information systems project manager can use a tool to help plan steps of a project and allocate and track resources in each phase.

"Pitcher" describes someone in the low-mobility, diverse tasks quadrant. The pitcher also communicates with team members, but the pitcher's tasks are more varied than those of the catcher. The nature of the pitcher's job requires him to use more individual discretion. He must coordinate players with various roles. One business example is a plant manager in a chemical company. This person must deal with union negotiators, chemists, common carriers and senior management. The manager's microcomputer must handle a wide variety of applications software and be able to send and retrieve messages and numerical data within the organization.

As a demonstration of how to apply the mobility-task framework, we have assembled nine microcomputers that are best suited for one of the four segments identified. The criteria used in selecting the representatives were:

- *Single user.* The microcomputers considered contain their own processing and storage capabilities. Host-based personal computing alternatives such as Information Builders, Inc.'s Focus or Mathematics Products Group, Inc.'s Ramis were not considered.
- *Direct experience.* We limited our selections to microcomputers that we could use ourselves to assess key strengths and weaknesses. Models that have been announced, but were unavailable for evaluation, were not eligible.
- *Anticipated payback less than one year.* Pricing was only a factor in relation to the anticipated benefits. We chose alternatives whose payback could reasonably be exected to be less than one year.
- *Distinctive advantage.* We narrowed the field of attractive candidates within a segment by choosing products with features that we felt would be valued as competitive advantages by people in that segment.

Market share was not a consideration in this evaluation because aggregating by overall popularity is contrary to our point: that the key to success is to consider the needs of separate market segments within an organization. Figure 2 shows which product fits into each particular segment.

Two attractive products for the "Outfielder" are Convergent Technologies, Inc.'s Workslate and Radio Shack's TRS-80 Model 100. Workslate is a dream come true for the person on the move who manipulates lists and analyzes numbers. Model 100 is better suited for the person who does a large amount of writing and editing.

The Grid Systems Corp. Compass and Compaq Computer Corp.'s Compaq Portable Computer are appropriate for the "Shortstop" category, which includes mobile professionals involved in many diverse activities. The Compass is revolutionary in several respects. It boasts tremendous power and storage, including a 16-bit CPU, 256K bytes of random-access memory (RAM), strong follow-up support, innovative features such as

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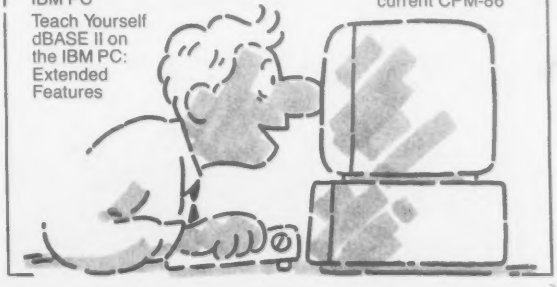

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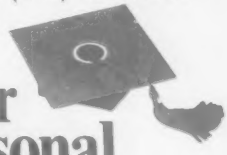

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MICRO MISSION

384K bytes of bubble memory and a flat, electroluminescent display and flexible communications capabilities. The Compaq is bulkier but cheaper, with more conventional components such as disk drives instead of bubble memory and a CRT instead of an electroluminescent display. The Compaq's claim to fame is complete IBM Personal Computer compatibility. Like it or not, the ability to run any software that is designed for the industry leader is a significant benefit.

Although both are considered portable computers, there is quite a difference between lugging the 30-lb Compaq through airports and carrying the 10-lb Compass. More importantly, the two systems are used somewhat differently at a client's location. The Compaq is an excellent tool for text editing, planning or number crunching behind the scenes. The Grid Compass works well there, but is also elegant enough — and unobstrusive enough — to use in a conference room while working with clients. In addition, the uniform global commands make the Compass extremely easy to learn and to use. The Compass' higher price must be weighed against these advantages.

People in the "Catcher" quadrant need tools to help them perform their specific tasks. Any microcomputer suggested for this category must be linked to the specific vertical application that it will simplify. For example, the Nastec Corp. MTC2000 is a workstation for systems designers. Its ability to intermingle text, diagrams and programming code make it convenient for programmers and systems designers to document and control a software development project.

The Apple Computer, Inc. Lisa is an excellent tool for specialized tasks such as construction project planning or software design. Even so, Lisa is on the border between the "Catcher" and "Pitcher" quadrants because professionals facing a variety of tasks can also use its six software applications. Lisadraw, for freehand graphics, and Lisaproject, for planning and managing work, are powerful tools that have not been seen on any other microcomputer. Anyone from a project manager to a financial analyst to an advertising account executive can use them to produce higher quality results in less time. With Apple's recently announced price cut, Lisa is a bargain for a wide variety of users.

The "Pitcher" quadrant is the most populated and the one most heavily targeted by microcomputer vendors. People in this quadrant need a broad variety of applications software and the ability to retrieve information from many sources in the organization.

IBM has leveraged its dominance in the mainframe computer market to become a reliable standard in the microcomputer industry as well. The IBM Personal Computer and XT have a wide selection of available software for business applications.

The new Hewlett-Packard Co. HP 150 is another versatile power horse for people in the "Pitcher" quadrant. A unique feature is its touch-screen interface. Time will determine if the marketplace will reward HP by considering that feature a valuable benefit. Its novelty is intriguing, but we often found ourselves reaching further to touch the screen than we would have reached to hit a function key. Still, the HP 150 represents a tremendous value. It is priced to compete directly with the IBM Personal Computer, yet it processes information two-thirds faster than the Personal Computer and compares favorably along other performance and ease-of-use criteria. In organizations with HP 3000 installations, the HP 150 can prove especially useful by accessing the HP communications network.

Another attractive microcomputer for "Pitchers" is the Wang Laboratories, Inc. Professional. It is best suited for people in an organization that already has a dedicated office automation system like the Wang OIS. The Professional is a powerful standalone tool, but somewhat overpriced unless you can exploit its feature of document compatibility with other Wang word processing systems.

Today, all professional ball players use gloves designed specifically for their positions. But at one time, customizing a glove was the innovation that gave the New York Giants a competitive advantage and immortalized Buck Ewing. Now, microcomputers pose a similar opportunity to business professionals. How can you benefit from the lessons of baseball history?

First, remember that different players on any team need different equipment to make their best contribution to the team's performance. Second, professionals without the leverage of personal computing are like ball players without gloves. Unless the opponent also lacks such equipment, even a very talented team will have a tough time winning. Third, the life of a particular brand of microcomputer may not be much longer than a baseball season. This fact reinforces the point that competitive advantage is reason enough to equip your team with what is available today. The increased revenues and profits from a winning season dwarf the cost to equip a team properly. Go for the pennant.♦

Doersch and Kosnik are office information systems consultants with American Management Systems, Redwood City, Calif.

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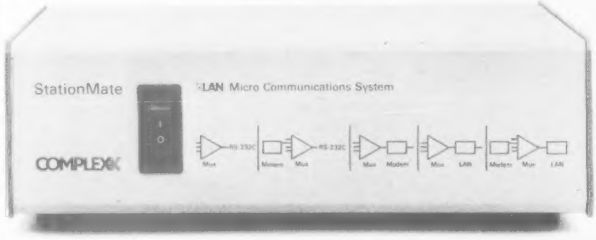

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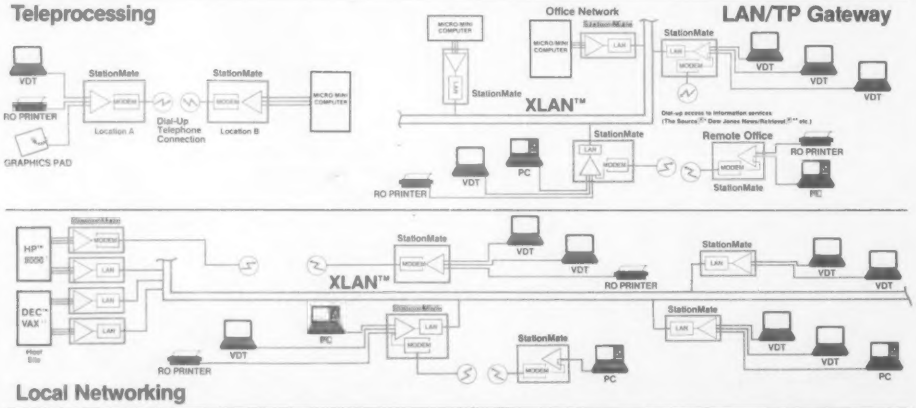

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E·X·T·R·A·!

THE CONSTRUCTION OF AN INFORMATION CENTER

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[illegible] an [illegible] to thr[illegible]eas: [illegible] hy [illegible] organization want to [illegible] formation center? The second area concerns the information center planning process: How does an organization begin and what logical progression should it follow? The third area involves information center deliverables. [illegible] software, hardware, sup[illegible] education and training is [illegible] the primary driving fo[illegible] creation of an information [illegible] ronment is the need to enable the end-user managements and staffs to respond to an ever-increasing need to

make more timely and accurate business decisions by using automated systems and facilities.

The impetus behind the movement toward information centers is the need to convert large quantities of data more rapidly into concise information. Fundamentally, this need stems from the convergence of computing technology with the availability of software and management's increasing awareness of the value of automated systems or computer literacy.

Information centers enable information systems management to make the most productive use of their information systems professional staff. They enable end users to respond to their own ad hoc information needs via the information center deliverables. This significantly reduces the ad hoc applications backlog within the information systems group.

The figure on the right summarizes the major aspects of the information center strategic planning process. As an organization considers its information center planning, the following four areas should be addressed in order:

- *Potential information center user requirements analysis.* During this planning activity, managements must thoroughly analyze and define the different types of activities to be performed within the information centers.

Managements have made many assumptions about their understanding of the potential user requirements. They have assumed they understand the types of software, hardware and support deliverables necessary to fulfill the information needs. Managements have not devoted enough time to understand fully or anticipate the changes and growth that can occur once information centers are established.

- *Potential information center user knowledge and expertise.* The information center user knowledge level and expertise must be assessed. Management must chose which of two philosophies to implement first: user self-sufficiency or information systems dependency.
- *Preparing for information center implementation.* During this portion of the planning process, attention is given to three implementation issues. These are the physical characteristics and attributes of information center environments, the potential phases or evolution through which the information centers will pass and the functional activities to be performed.

Managements should anticipate a rapid movement through five phases of their information center activities. The phases are initial independent information needs, multiple independent information needs, integration of multiple application and data, expanded application processing and total business planning and analysis.

Information centers tend to pass through all five major phases within 18 to 24 months. A thorough analysis of the software to be utilized to fulfill the functional activity sets is necessary. Without a thorough analysis, managements can anticipate moving through several iterations of software in trying to fulfill the users' requirements.

- *Understanding and managing information center operations and proliferation.* The final phase of the information center strategic planning process deals with anticipating what will happen within the information centers as they are brought into operation. Management must anticipate growth patterns or proliferation and the need for resource requirements planning. It must assess the initial capital requirements and ongoing or recurring operating expenses.

Without some form of resource capacity planning, there may be a significant impact on the production systems environments as information center utilization expands. Management must continually audit and test the logic used to assess planned vs. actual user resource requirements.

The entire planning process must be more thorough in assessing the types of software systems required. Some managements try to fulfill too many of their requirements with a single software system.

The categories of software required in an information center are quite diverse. Management must first consider the generic categories of software that may be necessary and the time intervals over which they will probably evolve.

Between the ninth and the 18th month, considerable new incremental software is introduced as a result of more inexperienced users being introduced to the center. These new users generally do not have the background or understanding needed to use this software. Therefore, a need for more user-friendly software develops.

During the initial independent information needs phase, there are many viable hardware delivery systems to fulfill the center's processing requirements. These include standard 3270-like on-line terminal devices, stand-alone personal computer systems and remote computer services facilities. Delivery systems initially used to implement information centers were nested around standard 3270-like devices. The majority of these devices are used to fulfill production system user requirements. Most managements believe that personal computers and remote computer services systems are the best delivery systems to fulfill decision support system user requirements.

Remote computer services are viable when the decision support user has experience with more sophisticated application software and computing facilities. In most instances, hardware delivery systems are currently in place within the organizations.

One of the major factors influencing the choice between personal computers or remote computer services is the type of base application software provided, such as Visicorp's Visicalc and Lotus Development Corp.'s 1-2-3. Frequently, the decision support system user requirements are more sophisticated than those that can be delivered. In such cases, the user requires more time-sharing-based deliverables that feature more powerful computing resources and sophisticated software. The remote computer services companies offer sophisticated financial planning and analysis systems.

Within the sixth to 12th month of information center operations, the user and information systems managements recognize the need for integrating multiple independent information needs and a variety of data. This need expands the hardware delivery system resource requirements for more computing and I/O capacity. With these expanded needs, a requirement to integrate personal computers into the large-scale in-house computing or remote computer services environments develops rapidly. Additionally, demand for expanded processing resources and data access via the on-line 3270-like terminal devices also expands.

Particular attention must be given to assessing the type of hardware delivery system required by the production support system user as compared with the decision support system user. Difficulties with protocols and operating characteristics coupled with the communications bit/sec rates are the most frequently encountered problems.

As an organization enters the expanded application processing phase, there is a continued expansion in the demand for hardware processing resources. There is a need for more integration of the personal computer devices and possibly the introduction of distributed minicomputer facilities. The minicomputers, as situated in the information centers, act as communications controllers and begin to provide expanded capabilities for pre- and post-processing activities.

The amount of data extraction and data manipulation activities between the information center user's device and the larger host mainframe operating environments expand significantly. At this point, data base management systems and application development facilities are definitely sought.

These types of software systems introduce a requirement for more powerful local and centralized host processing resources. As the users pass through the expanded application processing activities, a need develops for various kinds of workstations.

One of the major and most commonly unfulfilled hardware requirements found in information centers is local networking. The facilities and capabilities to connect multiple remote, stand-alone information center hardware devices easily and cost effectively are required in the later stages of information center evolution. A corporate local computing device policy should be devised well in advance of initiating information center activities.

The role and relationship of the information center support staff is a critical component of the overall information center deliverables. The support staff assists the users to define further their information needs and, in doing so, provides direction in selecting the proper information center resources to respond to the users' requirements. This staff fulfills the role of an educator: It helps the users understand how to use the center's resources.

User Information Requirements
Implied Data Requirements
Preliminary Deliverable Requirements
• Software
• Hardware
• Support
Financial Considera-tions
Level of User Self Sufficiency vs. Information Systems Dependence
Potential Information Center User Requirements Analysis
Under-standing and Managing Information Center Operations and Proliferation
Potential Information Center User Knowledge and Expertise
Resource Requirements Planning
User Certification Processes
Preparing for Information Center Implementation
Potential Information Center Proliferation
Information Systems Support Staff
Functional Activity Sets
Information Center Phases and Evolution
Information Center Physical Character-istics and Attributes

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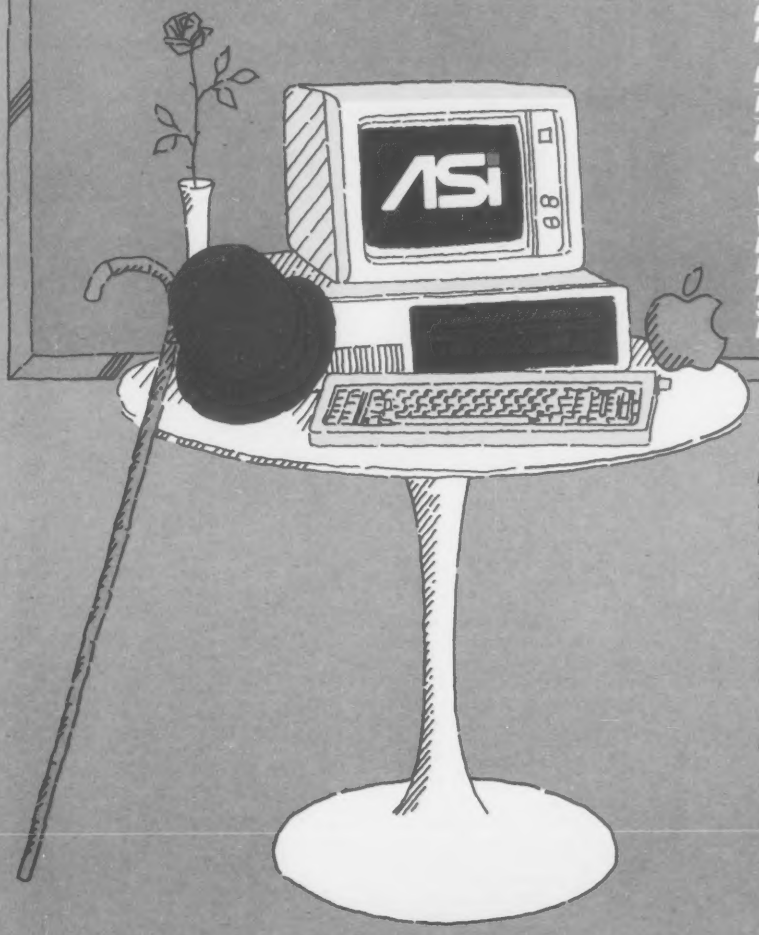
Peachtree A/P

Operating Systems
CP/M
MS/DOS
PC/DOS

Integrated Software
Lotus 1-2-3



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This support staff also minimizes the impact of the information center activities on the host processing resources.

During initial information center support group staffing, particular attention must be given to development of a support staff charter or mission statement. There is a need for specialists with distinct professional skills in end-user software, remote computing devices, education and training, on-site information center support and remote computing services.

When an organization is following much slower development and integration of its information center, the full-time availability of these specialists is certainly not necessary. However, it is extremely important that specialized expertise be available in all stages of the planning process and subsequent implementation. Within the first six months of establishing an information center environment, incremental education and training requirements will appear. These requirements will be significantly more diverse and complex than was originally believed. This is a result of considerably more software capability being introduced into the information center environment.

Organizations attempting to deliver information center training via conventional classroom approaches must develop a considerably larger education and training staff than originally planned. Audiovisual delivery systems have been found to be more acceptable in fulfilling the education and training requirements. The audiovisual programs, however, must be augmented with some type of hands-on experience. Organizations have successfully developed combination audiovisual and hands-on workshop programs that satisfy the education and training requirements.

Many audiovisual programs are being augmented with a computer-based training component that adequately fulfills the hands-on training experience necessary. In many cases, this audiovisual computer-based training is being delivered via microcomputer-based systems. ♦

Mills is president of Dialogues Research Service, Dallas.

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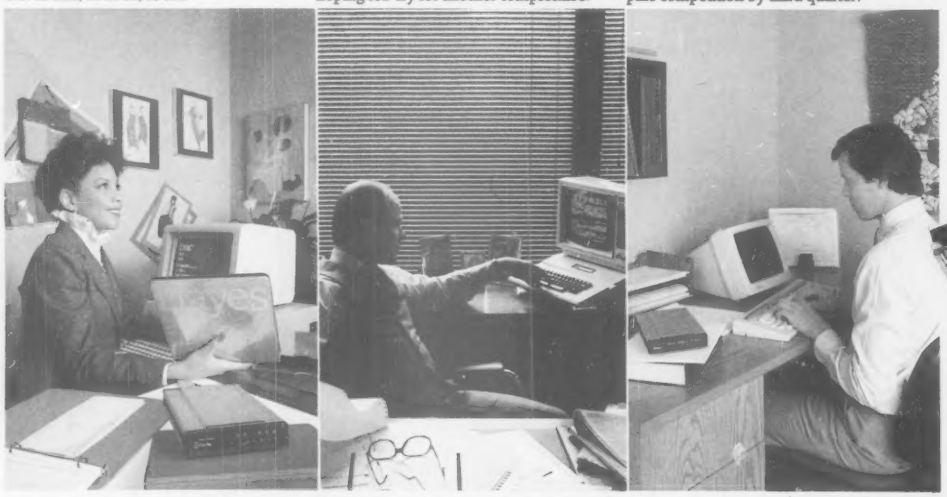
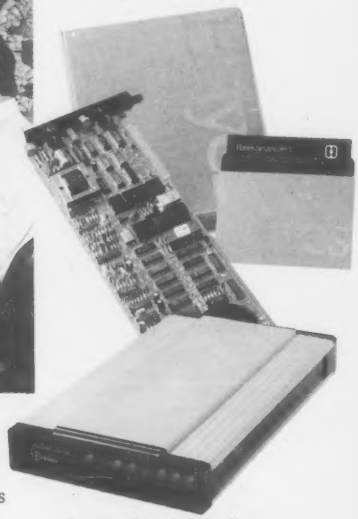


Smartcom II communications software, currently available for IBM PC, DEC Rainbow 100, Xerox 820-II and Kaypro II.



Smartmodem 1200 for all computers with an RS-232C interface; Smartmodem 1200B plug-in board for the IBM PC.

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Smartmodem Specifications:
Low Speed Data Format: (Smartmodem 1200 and Smartmodem 300) Serial, binary, asynchronous: 7 or 8 data bits; 1 or 2 stop bits; odd, even or no parity (0-300 bps).
High Speed Data Format: (Smartmodem 1200) Serial, binary, asynchronous: 7 data bits; 1 or 2 stop bits; odd, even, or fixed parity or 8 data bits; 1 or 2 stop bits; no parity (1200 bps).
Dialing Capability: Touch-Tone® and rotary-dial pulse dialing.
Command Buffer: 40 characters.
Commands: (unnecessary with Smartcom II software) A: Immediate answer. A/: Repeat last command. C: Transmitter Carrier. D: Dial command, including simple dialing, waiting for second dial tone, auto-dialing and other features. E: Local echo. F: Full/half duplex. H: Switch hook. M: Audio monitor. O: On-Line. P: Pulse dialing. Q: Quiet mode. R: Reverse originate/answer mode. S: 17 "Set" commands speed, escape code character, number of rings to answer on, etc. S?: Checks operational parameters above. T: Touch-Tone dialing. V: Verbal result codes.
Result Codes: (can be numerical/verbal): 0/OK: Command line ok. 1/Connect: Carrier detected. 2/Ring: Phone is ringing. 3/No Carrier: Carrier lost or never heard. 4/Error: Error in command line. 5/Connect 1200: Carrier detected at 1200 bps. (Smartmodem 1200 only.)
Audio Monitor: Two-inch speaker with volume control.
Rear Panel: On-off switch, power jack, RS-232C connector, modular phone jack connector, volume control.
Operation: Full or half duplex.
Data Rate: 0-300 bps and 1200 bps for Smartmodem 1200; 0-300 bps for Smartmodem 300.
Interface: RS-232C.
Intelligence: Z8™ microprocessor with 4K byte control program for Smartmodem 1200; Z8 microprocessor with 2K byte control program for Smartmodem 300.
Modem Capability: Bell System 103 or 212A compatible originate or answer mode for Smartmodem 1200; Bell System 103 compatible originate or answer mode for Smartmodem 300.
Receive Sensitivity: –50dBm for Smartmodem 1200; –45dBm for Smartmodem 300.
Transmit Level: –10dBm.
Registration: FCC registered for direct-connect to the nationwide phone system. Connects with modular jacks RJ11W, RJ11C, RJ12W, RJ12C, RJ13W, RJ13C.
Power Pack: U.L. listed 120VAC, 60Hz. 13.5VAC output.
Size: 1.5" × 5.5" × 9.6"

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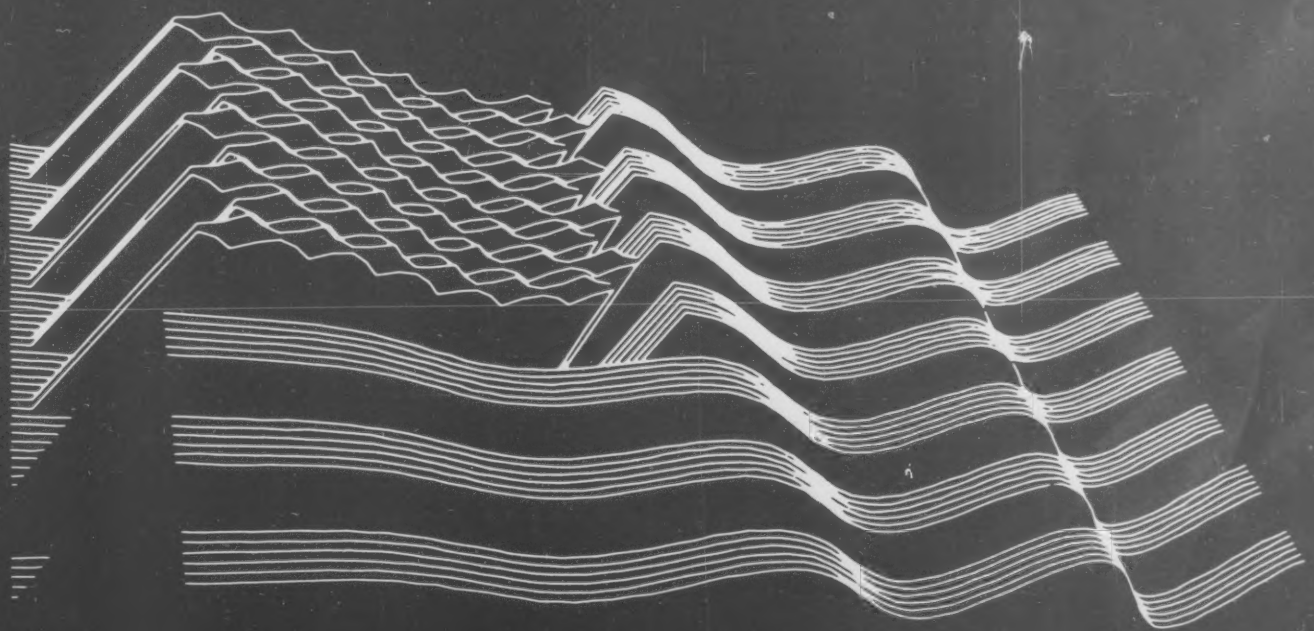
THE NEW WAVE OF COMPUTER GRAPHICS

By Alexis Driscoll and Robin Howard

Computer graphics in business applications is fast becoming an essential tool for time-pressured managers. Sales of graphics software are projected to grow at a rate of 40% per year through the '80s, making graphics one of the fastest growing markets in software. What can DP managers do to meet the growing need for graphics without increasing the drain on their personnel and systems? One solution is distributed graphics for microcomputers.

Graphics is a valuable tool for managers for several reasons. Studies have shown that visual presentation of information markedly increases both the speed and volume of comprehension. Meetings are on the average 28% shorter, which is a boon to managers who are estimated to spend up to 60% of their time in meetings. Ease of comprehension aids the manager in reviewing and analyzing data. In addition, graphics presentations are attractive to business users because they have been shown to be more persuasive. As a result, the demand for business graphics

(Continued on Page 78)



A Guide to Graphics Software

	Business & Professional Software, Inc.'s Business Graphics	Decision Resources, Inc.'s Chartmaster	Innovative Software, Inc.'s Fastgraphs	Ferox Microsystems, Inc.'s Graphpower	Graphic Communications, Inc.'s Graphwriter	Software Publishing Corp.'s PFS: Graph	Visicorp's Visitrend/ Plot	Lotus Development Corp.'s 1-2-3
Operating System: DOS	Yes	Yes	Yes	No	No	Yes	Yes	Yes
UCSD's P-System	Yes	No	No	Yes	Yes	No	No	No
Product Aids: Command Format	English	Menu	Menu	Menu	Menu	Menu	Menu	Menu
On-Screen Help	Yes	No	No	No	Yes	No	No	Yes
Documentation: Tutorial — Diskette	Yes	No	No	No	No	No	No	Yes
Tutorial — Manual	Yes	Limited	No	Yes	Yes	No	Yes	No
Data Handling: Nontime Series	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Data Extraction: Text Files	Yes	No	No	Pascal only	No	No	No	Yes
Sylk Files	Yes	No	No	No	No	No	No	No
DIF Files	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Graph Types: Line:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dash Types	5	8	0	6	5	0	0	0
Symbol Types	8	0	6	0	4	4	6	6
Bar: Horizontal	Yes	Yes	Yes	No	Yes	No	No	No
Clustered	5	24	6	Varies	8	4	2	6
Stacked	Yes[a]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pattern Types	7[b]	8	9	5	8	6	3	8
Three-Dimensional	No	No	Yes	No	No	No	No	No
Pie: Exploded Slice(s)	No	Yes	Yes	No	No	No	No	No
Scattergram	Yes	Yes	No	No	Yes	No	No	No
Symbol Types	8	8	0	No	4	0	0	0
Multiple Graphs/Chart	Yes	Yes	Yes	No	Limited	Yes	Yes	No
Sequenced Presentations	Yes	No	Yes	Yes	No	No	No	Yes
Axes: Range Control	Yes	Limited	No	Yes	Yes	No	Yes	Yes
Scale Control	Yes	Limited	No	Yes	Yes	Limited	Yes	No
Screen Color: User-Specified	Yes	Yes	No	No	Yes	No	No	No
Screen Colors	16	16	3	0	10	4	0	3
Text: General Title	1 line	4 lines	1 line	5 lines	3 lines	1 line	1 line	2 lines
Legends	45	24	6	Varies	8	4	6	6
Horizontal Axis	1 line	2 lines	1 line	1 line	1 line	1 line	No	1 line
Vertical Axis	1 line	2 lines	1 line	1 line	1 line	1 line	1 line	1 line
Floating Text	Yes	No	No	No	No	No	Yes	No
Statistical Functions: Min., Max., Sum	Yes	No	No	No	No	No	Yes	No[e]
Mean, Var., Std. Dev.	Yes	No	No	No	No	No	Yes	No[e]
Curve Fitting: Linear	Yes	Yes	No	No	Yes	No	Yes	No[e]
Constant	Yes	No	No	No	No	No	No	No[e]
Logarithmic	Yes	Yes	No	No	Yes	No	Yes	No[e]
Parabolic	Yes	No	No	No	No	No	No	No[e]
Sinusoidal	Yes	No	No	No	No	No	No	No[e]
Exponential	Yes	Yes	No	No	Yes	No	No	No[e]
Curve Smoothing	Yes	No	No	No	No	No	Yes	No[e]
Distribution	Yes	No	No	No	No	No	No	No[e]
Point Generation	Yes	No	No	No	No	No	No	No[e]
Hardcopy Output: Dot Matrix Printers	31	0	0	0	0	11	3	13
Letter Quality Printers	20	0	0	0	0	1	3	0
Plotters	29	20	10	2	7	9	0	3
Suggested Retail:	$350	$375	$295	$495[d]	$395[c]	$140	$300	$495

The information in this table is believed to be correct based upon vendor documentation, but cannot be guaranteed.

[a] When drawing stacked bars on a plotter, there will be color overlap.
[b] When using a plotter, patterns are limited to those which can be accessed by the plotter itself.
[c] The basic Graphwriter set ($395) supports a limited number of graph types. Area charts and other more advanced graph types require the extension set ($590).
[d] Graphpower is available at two different prices: $295 for use with the HP 7470 and $495 for use with the HP 7220.
[e] All statistical functions and data manipulation must be performed through manual entry of the formulas within the spreadsheet section of the package.

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(Continued from Page 75)

is increasing and will continue to do so. The type of situation that requires business graphics places a special burden on the department, creating a problem for the information manager providing graphics. Executives operate in a data environment fundamentally different from production applications. Decision support and the presentation of analysis often require data over a longer time frame. They involve more summarization and less detail. When the analysis involves current or projected data, that data is often dynamic, sometimes variable or uncertain and often difficult to define.

In addition, the situation giving rise to the demand is different. Ad hoc needs and last-minute changes are frequent, making rapid turnaround essential. Presentation graphics are often customized, requiring close interaction between the manager and the program.

When all graphics capability is located in the DP department, the increased demand for nonstandard output places a new strain on the facility. One solution is to cut loose those nonstandard, nonroutine tasks by implementing microcomputer graphics software.

When all graphics capability is located in the DP department, the increased demand for nonstandard output places a new strain on the facility. One solution is to cut loose those nonstandard, nonroutine tasks by implementing microcomputer graphics software.

Business graphics on microcomputers resolves the problem from both sides. Use of micros relieves DP services of tasks that are unnecessary or inappropriate. From the manager's perspective, the ability to interact with the program eliminates the problems of an intermediary between the manager and the system. Managers can get the graphs they want. This interaction is essential both to analysis of data and to customizing graphs. Secondly, since they or their staff create the graphs themselves, they control the turnaround time. They get the graphs when they want them.

Turnkey systems, which provide hardware (usually minicomputers) and software dedicated to graphics, offer some excellent graphics capabilities. However, when they are contrasted with personal computers that have off-the-shelf software, there are several trade-offs to consider.

The first trade-off is cost. Turnkey systems cost in the range of $35,000 for up to approximately six units. Add-ons cost approximately $12,000 to $15,000 each. By contrast, a standalone micro unit including hardware and software costs less than $5,000. In many cases, the hardware is already in place, reducing the expense to a range of $200 to $600.

The second trade-off is the cost-benefit ratio. In the realm of micros, cost is not the distinguishing feature. Even if both the cost of the micro and software are considered, when compared with a turnkey system, it is possible to purchase approximately 80% to 90% of the capability for 10% to 15% of the cost — or less.

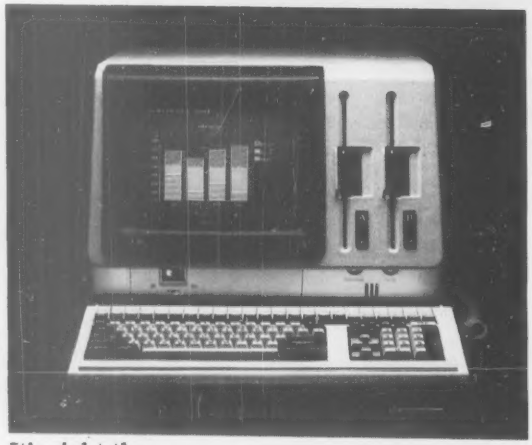
The last trade-off involves the tactical issues raised by a turnkey system's cost. A high price provides an argument for centralization of the expensive resource in order to maximize utilization. This centralization is directly contrary to the intent of distributing graphics capability to the user. Much of the ease of access, if not ease of use, is sacrificed.

Before evaluating programs, it is essential to determine the needs that the programs must serve. Until recently, presentation was the primary function of business graphics, and it is still the most basic and first-used application.

The more important the presentation is, the more aesthetic options are required of a program. How much control over the visual image is required? User needs may be defined within the following parameters:

- *Graph types.* How many are there and how sophisticated? Can you overlay one graph on another, such as a line above bars? Can you place two graphs side by side on one axis, such as a line beside bars? Can you create horizontal bars? Can you have more than one graph on a single page?
- *Range of axes.* How many variables can be displayed, including legible labels? Some programs can accept many data points but cannot legibly display 24-month labels. Can you control the frequency or appearance of labels?
- *Control of axes.* Does the program calibrate the range? Can you set the range?
- *Color selection.* How many colors are available for screen presentations and slides? How many can be displayed on the screen at one time? Can the users specify background as well as foreground color? Does a color program display on a monochrome monitor?

CAN YOU FIND THE IBM* 3278 HIDDEN IN THIS PICTURE?



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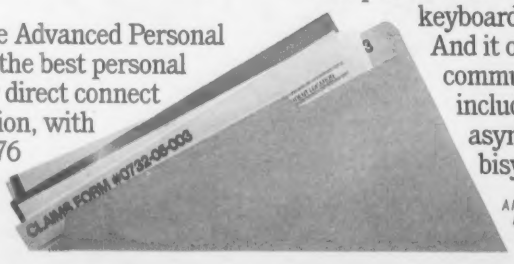

A MAJOR INSURANCE COMPANY IS USING THE ADVANCED PERSONAL COMPUTER TO GREATLY INCREASE WORKER PRODUCTIVITY.

● *Text on graphs.* How many titles are there? What types: axis or legends? Are they vertical as well as horizontal? Can titles be placed anywhere on the graph such as numbers on top of bars? How many fonts are possible? Can you create word charts? How many fonts can appear on one screen?

● *Selection of fill, line, mark and grid type.* How many options are there? Can you specify them or are they in a fixed cycle?

As managers have become more accustomed to visual data through the use of presentation graphics, demand for analytic graphics has increased and will continue to increase. Many simple forms of analysis may be performed within certain micro graphics programs.

It is essential to determine the sophistication of the analysis to be performed. Trend analysis should be considered. Is spotting trends visually the extent of analysis or is curve fitting required? How much statistical analysis is required? Is drawing a trend line sufficient or should the program generate points along the curve as well?

Data transfer and manipulation should be considered. How extensive is the data? How much manipulation does it require? Some programs transfer data, with varying degrees of ease, between spreadsheet programs and graphics programs. Some programs allow simple data manipulation within the program itself.

Do managers receive information routinely? If so, there are programs that allow the creation of standardized graphs similar to those produced on a mainframe. Parameters of the graphs can be established once, and subsequent users need only edit data.

Once an application profile has been developed, there are two other variables to consider: desired output and time. Output varies considerably in quality, time and cost. For particular informal presentations, monochrome charts produced on a printer are quicker and less expensive than color charts produced on a plotter. These options, as well as the ability to create slides and transparencies, are not only a function of the hardware, but also of the software's ability to interface with it. Some programs also allow the presentation of sequenced displays on the monitor in place of slide shows.

Where software is concerned, less time is not necessarily a function of more money. Some programs that are comparably priced are slower than others. Programs vary in the time it takes to process an entry. More importantly, programs vary in the time it takes to load, change graph styles, change data and transfer data. When multiple charts are produced, time becomes an important factor.

Once users' needs are determined, the programs to meet those needs can be evaluated. There are several criteria to apply.

A program chosen for one application, such as analysis or presentation, should contain a breadth of options associated with that application. If the program contains several applications, such as analysis and presentation, opt for sophistication. Some multiple applications programs, particularly within integrated programs, are excellent introductions to graphics, but are outgrown very quickly even by inexperienced users. Expect user sophistication to grow rapidly at first. Similarly, expect a proliferation of data requests and opt for a program that most easily acquires data from a multitude of sources.

If the program contains several applications, such as analysis and presentation, opt for sophistication. Expect user sophistication to grow rapidly at first. Similarly, expect a proliferation of data requests and opt for a program that most easily acquires data from a multitude of sources.

Currently, there are no truly portable graphics products available for microcomputers. However, some products can become standards in a micro environment if the same program is available on several of the major brands of micros. In an environment in which several brands are already in place, user training is simplified. In addition, user retraining is not required as users change or add different brands.

The addition of peripherals will constitute the richest and most prolific growth where graphics is concerned. The ability to grow in a logical and controlled pattern requires software that interfaces with a broad range of peripherals.

Software must be able to utilize the logical intelligence of peripherals. Without this ability, the performance of peripherals such as plotters and printers will be constrained with regard to such items as scaling, fill types, font styles and color.

The importance of ease of use cannot be overstated. Managers need a program that is easy to learn and easy to use. The first prerequisite is

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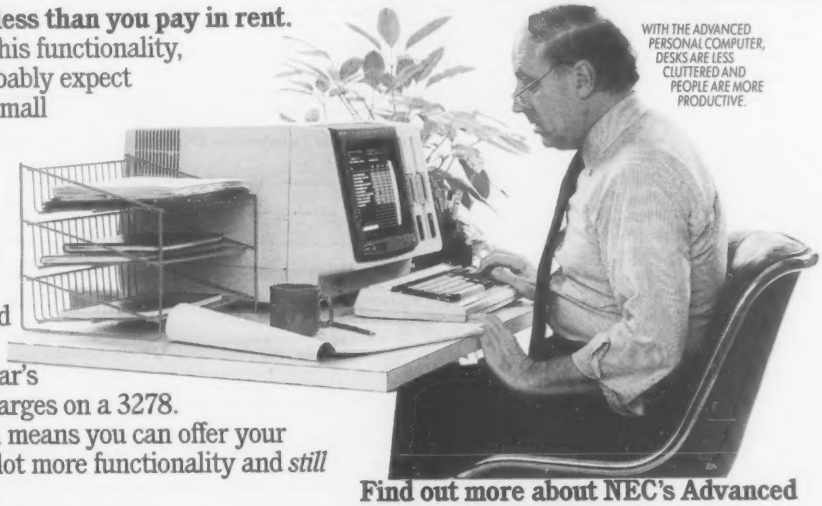

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MICRO MISSION

either menus or English-like commands. Menus have the advantage of being easy to learn at first, but a common complaint is that more experienced users find them awkward and slow. If a high turnover of users is expected, then menus may be the best choice. However, users who expect to use the program frequently will likely opt for a command interface with English-like commands.

If the program is meant to customize graphics or experiment with data, it should be easy to use. Standard formats are only easy for producing standardized graphs. It should be easy and quick to change your mind about the type of graph, graph elements and data input. It should be easy to preview the graph while it is being created.

When choosing between two comparable programs, choose the one with better documentation. Documentation that is thorough and easy to understand is the key to users learning the program and developing their skills. It should include a tutorial with exercises for the novice and a variety of reference materials for the experienced user. On-screen tutorials are an excellent tool for overcoming reluctance to interact with the program. Look for a comprehensive reference section within the manual and foldout or pocket charts for quick reference. In addition, look for comprehensive Help screens within the program.

Telephone customer support, in which the manufacturer answers user questions about the program, can deflect much of the onus of training and troubleshooting from information managers. Support varies among vendors. Some have formal customer support programs, while others deal with questions on an ad hoc basis. Some have toll-free numbers; others do not. Since questions will continue to arise as user skills develop and equipment is added, quality customer support is an essential time-saver.

When micro graphics is introduced to a firm, the use of graphics and its variety of uses tend to mushroom shortly thereafter. When first surveyed, many potential users cannot conceptualize their graphics needs. However, once graphics is accessible to them and they become familiar with its capabilities, either directly or through others, applications multiply. Users also become more sophisticated in their skills. In addition, some of the demand for graphics comes from the recipients of graphs, not the creators. Executives soon discover the value of graphics presentations and demand more of them. For all these reasons, it is wise to allow options for expansion when making initial purchases.

Although expansion may be an upgrading to more sophisticated programs or hardware, it may also be just a proliferation. The two should not be mistaken. Not every application requires an 8-color plotter or a statistical package. Planned expansion will consider upgrading equipment, but also the provision of a variety of options regarding speed, quality and capacity.

The micro invasion of the office is a fact. But microcomputing is personal computing. The name is an index of its use. It is not a replacement for the tasks normally performed by DP departments, but rather a supplement. It has the added advantage of relieving DP of current tasks that drain its resources, tasks that are better performed elsewhere.

Graphics is an excellent example of such a task. With the advent of microcomputers, many nonstandard, ad hoc graphics tasks can now be located where they belong — with the user.

Graphics is just being introduced into the business environment in quantity. Now is an ideal time for professionals concerned with information management to intervene to assure that this new wave of information processing is properly managed. ♦

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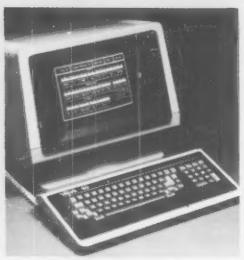

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*MICROSYSTEMS—March 1983
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